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A BIOLOGICAL JOURNAL

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SOUTHERN EXTENSION OF CALIFORNIA FLORA.

BY T. S. BRANDEGEE.

The flora of the Peninsula of Baja California has usually been considered to be nearly the same as that of Southern Alta California, and Mr. Hemsley for that reason has given it no place in his Botany of the Biologia Centrali-Americana. A region extending through nine degrees of latitude, having California for its northern boundary and its southern portion lying within the tropics, with its northern vegetable life controlled by the alternation of winter and summer and its southern dependent on tropical rains, cannot possess a similar flora throughout its entire length.

There is a point situated between these extremes of latitude and differences of climate where there is a change in the flora, a change from that of the south to one that is in great part Californian. The middle latitudes of the Peninsula do not seem to have any well defined seasons of vegetable life, and the time of flowering may follow winter rains of the northern climate if they should extend southward, or the summer showers from the tropics when they reach northward. Even as far south as Magdalena Bay this shifting of growing season is apparent, and my own visits there have shown me that in two successive years all the annuals and most of the perennials burst into life with the new year in consequence of the December rains, but during a following year, in January, hardly a flower could be seen, most of the bushes were leafless and the only signs of vegetable life to be found were remnants from the profusion that existed in October after a series of heavy tropical rains. The point at which the most decided change in the flora is seen occurs at about latitude twenty-eight degrees, in the vicinity of El Campo Aleman, and Calmalli, on the divide between the drainage sloping

southward into the San Ignacio Lagoon and that running northwest into the Pacific.

It has been shown in Zoe* that the flora of the Cape Region shows a greater affinity to that of Sonora than to that of Alta California and a preponderance of Mexican forms prevails as far north as Calmalli, where the vegetation, on account of the disappearance of southern plants and the accession of numerous northern ones, assumes a decidedly Californian aspect. Of course there is not as great a change as would be caused by the intervention of a high mountain range or a body of water, but at the lower and middle elevations the traveler from the south soon perceives a difference in the surrounding vegetation after crossing the low divide before reaching Calmalli.

East and west of this dividing region, higher and as yet unexplored mountains extend southward and doubtless carry along their summits many Californian plants to a lower degree of latitude, and the impossibility of drawing a line between the northern and southern floras is further shown by the fact of maritime species of the Pacific Coast extending their limits southward a greater distance than would be suspected, especially upon the islands, in the same manner as the more southern maritime flora is continued northward to those islands off the coast of Alta California.

There is another locality, equally important concerning the southern extension of Californian flora and especially interesting in that it must certainly be the most southern habitat of many plants. This interesting region is the high mountain known as San Pedro Martir, situated about one hundred and twenty-five miles southeast from San Diego, and much nearer to the Gulf of California than the Pacific Ocean. It is an extensive plateau rather than a mountain, having an elevation of seven or eight thousand feet and traversed by numerous rocky ridges reaching two or three thousand feet higher. It is the highest part of the elevated region extending southward from Campo and the Cuyamaca Mountains, which here culminates and falls away at the south to so low an elevation, that in crossing the Peninsula from

*Zoe iii, 223.

El Rosario to Calamujuet, no considerable range impedes the traveler.

The climate of San Pedro Martir is cold in winter; ice is formed on standing water even during the month of May, and like most elevated regions the rainfall is greater than on the neighboring lower lands.

The ridges traversing the plateau have a barren, desolate appearance, and the large rounded rocks with which they are covered form a striking feature of the landscape. Between these ridges little brooks arise and find their way at first through extensive green meadows, then run rapidly down the very steep mountain sides toward the Pacific Ocean. Trees of good size are found almost over the whole plateau and in some places are very abundant. *Pinus Jeffreyi* is the most common, but on the ridges a few sugar pines (*P. Lambertiana*) and along the streams some cedars (*Libocedrus*) keep them company. In a few localities some "quaking asp," "cypress" and silver fir can be found but they are not common, and at the lower elevations one of the piñon pines, *P. Parryana*, is almost the only tree. Oaks that never become large enough to be called trees are plentiful and form part of the underbrush that in many places, especially on ridges, is so thick as to be almost impenetrable; this chaparral is made up mainly of Manzanita and Ceanothus. Other bushes are scattered about and often in some localities they are abundant; the most noteworthy of these being: *Garrya Veatchii* at lower and *Garrya Wrightii* at higher elevations, *Rhamnus Californica* in almost every place and a willow common along the streams.

Our present knowledge of the vegetation of Northern Lower California has been mainly derived from several collections by Mr. C. R. Orcutt, who has traveled from its northern boundary as far south as El Rosario and San Fernando; and from the explorations of Dr. Edward Palmer about San Quentin and Lagoon Head. Mr. Orcutt has published a catalogue containing names of plants growing in Lower California, but no definite localities are given. The results of Dr. Edward Palmer's collecting have been published by the Department of Agriculture, and the California Academy of Sciences has printed in its Proceedings an account of the plants found on the trip between Magdalena

Bay and San Quintin. All plants mentioned in these publications as having been collected about San Quintin and farther south have been omitted from the following list. The writer made an excursion in May during the present year to San Pedro Martir, starting from San Diego, and the appended list contains names of plants collected at their most southern known habitat, and on this account is not a complete one of the flora of San Pedro Martir as it might seem from the frequency with which the name of this mountain appears:

Ranunculus aquatilis L. Common in and about the ponds of San Pedro Martir.

Ranunculus hydrocharoides Gray. Very abundant in the ponds of San Pedro Martir.

Aquilegia truncata F. & M. Common on San Pedro Martir.

Romneya Coulteri Harv. This is often seen along the valleys between Tia Juana and Colnett, and it is abundant on the hills about San Pedro Martir.

Dendromecon rigidum Benth. Along the edge of the plateau of San Pedro Martir.

Papaver Californicum Gray. On burned ground twenty miles south of Tia Juana.

Arabis Holbœllii Hornem. San Pedro Martir.

Vesicaria Fendleri Gray. San Pedro Martir.

Barbarea vulgaris R. Br. Common at the locality known as La Grulla, where it was probably introduced.

Cardamine paucisecta Benth. Cañon Salado.

Viola pedunculata T. & G. Colnett.

Arenaria alsinoides Willd. San Pedro Martir, perhaps its northern limit.

Calyptridium monandrum Nutt. Abundant from near Colnett to San Pedro Martir.

Montia fontana L. Very small plants growing amongst other vegetation in damp soil on San Pedro Martir.

Sidalcea malvæflora Gray. Growing in the wet meadows of San Pedro Martir.

Fremontia Californica Torr. A single specimen was found in the Salado Cañon near Colnett.

Linum perenne L. Common on San Pedro Màrtir.

Geranium cæspitosum James. San Pedro Martir.

Rhus ovata Watson. Common on San Pedro Martir.

Rhus integrifolia Nutt. This is usually a much branched shrub, but in some localities it becomes a tree having a diameter of more than a foot. It is known when large by the name mahogany.

Rhamnus Californica Esch. A very common bush on San Pedro Martir.

Ceanothus cordulatus Kellogg. A bush forming thickets six feet high. Flowers white and sometimes decidedly light purple in color. Highest elevations of San Pedro Martir.

Ceanothus Greggii Gray. Flowers white. San Pedro Martir.

Ceanothus Palmeri Trelease. Twigs green, leaves more or less dentate, flowers blue. The most beautiful species of Ceanothus on San Pedro Martir.

Ceanothus hirsutus Nutt. Slopes of San Pedro Martir.

LUPINUS PALLIDUS. Annual, a few inches in height, branching from the base, often spreading and forming tufts nearly a foot in diameter, densely strigose-pubescent and with some spreading hairs, leaflets five or six, spatulate, rounded at apex, 10-15 mm. long, usually much shorter than the petiole; stipules adnate for half their length: racemes short-peduncled, terminating the branches, capitate in flower, elongating but dense in fruit; bracts much shorter than the calyx: upper lip of calyx, 3 mm. long, deeply cleft into two divergent lobes; lower lip a third longer, oblong, very shortly three-toothed at apex; bracteoles none: corolla white without markings, about twice the length of the calyx; entirely glabrous; standard shorter than the wings and shortly cleft keel: ovary four-ovulate; pod pubescent, three or four seeded; seeds white marbled with black.

Sands in the dry bed of the creek near the Mission of San Vincente in northern Baja California, May, 1893.

Lupinus truncatus Nutt. Slopes of San Pedro Martir.

Hosackia grandiflora Benth. var. *anthylloides* Gray. San Pedro Martir.

Hosackia decumbens Benth. var. *Nevadensis* Watson. San Pedro Martir.

Hosackia crassifolia Benth. San Pedro Martir.

Psoralea orbicularis Lindl. Along streams among the foothills of San Pedro Martir.

Amorpha Californica Nutt. San Pedro Martir.

Amorpha fruticosa L. Guadaloupe Creek.

Astragalus circumdatus Greene. Common on San Pedro Martir. The growing plants are prostrate and the fruit lies upon the sand in which it usually grows. The green pods are fleshy after the fashion of *A. Caryocarpus* and the surrounding margin which is said to be "quite peculiar" and suggested the name of the species, appears only after drying.

Prunus emarginata Walpers. San Pedro Martir.

Rubus ursinus C. & S. Growing about the foothills of San Pedro Martir.

Fragaria Californica C. & S. San Pedro Martir.

Horkelia Californica Ch. & Schl. represented in northern central California by broader leaved forms which have received various names, as *Potentilla Kelloggii* Greene, *P. elata* Greene and *P. frondosa* Greene (which appears to be quite the same as *Horkelia grandis* H. & A. Bot. Beech. 339.) appears to diminish the size of its leaflets as it recedes from the seabord or goes southward. The southern and montane forms, *P. Parryi* Greene, *P. puberula* Greene, *P. Clevelandi* Greene and *P. Lindleyi* Greene (the latter substituted for *Horkelia cuneata* Ch. & Schl. on account of an earlier homonym, though there is an available synomym, *Horkelia Douglasiana* Nutt. Bot. Beech. 338.) reach on San Pedro Martir a leaf form almost as narrow as in typical Ivesia. There appears to be no character in the greater part of these proposed species to warrant their retention even as varieties. *P. multijuga* Lehm. is described without mention of the stamens, and including it in the synonymy of *Horkelia Californica* necessarily infers that the artist who made the drawing was mis-

taken not only in their number but in the character of the filaments.

Potentilla Wheeleri Watson. Growing on cliffs at dry, high elevations of San Pedro Martir. The plants are much larger than the original specimens and are very fragrant and somewhat glandular.

Potentilla glandulosa Lindl. San Pedro Martir.

Rosa Californica C. & S. San Pedro Martir.

Rosa minutifolia Engelm. Abundant near the coast from north of Ensenada to below El Rosario. It extends into the interior a dozen or more miles from the Pacific slope. In some localities most of the bushes produce white flowers.

Amelanchier alnifolia Nutt. San Pedro Martir.

Heteromeles arbutifolia Rœm. Growing along streams about the foothills of San Pedro Martir. This bush does not seem to have been found between here and the mountains of the Cape Region.

Heuchera rubescens Torr. San Pedro Martir.

Philadelphus serpyllifolius Gray. Common amongst rocks San Pedro Martir.

Ribes sanguineum Pursh. San Pedro Martir.

Œnothera biennis L. San Pedro Martir.

Megarrhiza Californica Torr. This is common at lower elevations and has been found far south of San Quentin. Specimens of variations in the shape and outline of the leaf were collected from one locality—they show all degrees of lobing between entire and divided nearly to the centre. This leaf variation is common in western species of Echinocystis and characters based on forms of the leaf evidently have no value.

Datisca glomerata B. & H. San Pedro Martir.

Cereus phœniceus Engelm. grows on San Pedro Martir and has been found as far south as Comondu.

Cereus gummosus Engelm. reaches to north of Ensenada, but the plants are dwarfed.

Selinum capitellatum B. & H. Common on San Pedro Martir.

Velæa arguta (T. & G.) San Pedro Martir.

Hydrocotyle ranunculoides L. San Pedro Martir.

Garrya Wrightii Torr. San Pedro Martir. Also found in the Cape Region Mountains.

Garrya Veatchii Kell. San Pedro Martir; the type was from Cerros Island.

Symphoricarpos mollis Nutt. San Pedro Martir.

Sambucus glauca Nutt. Not common on San Pedro Martir.

Lonicera hispidula Dougl. var. Common on San Pedro Martir.

Brickellia Californica Gray. San Pedro Martir.

Aplopappus linearifolius DC. Foothills of San Pedro Martir.

Chrysopsis sp. San Pedro Martir.

Erigeron concinnus T. & G. San Pedro Martir.

Erigeron flagellaris Gray. San Pedro Martir, a low form with rongh pubescence.

Antenaria dioica Gærtn. San Pedro Martir.

Franseria chenopodiifolia Benth. From Magdalena Bay to north of Ensenada.

Franseria bipinnatifida Nutt. Sea beach at Colnett.

Franseria camphorata Greene. Mesas about Vallederos.

Helianthus Californicus DC. Very abundant on San Pedro Martir and San Telmo Creek.

Leptosyne maritima Gray. Nearly to Cape Colnett.

MADIA VALIDA. Perennial, suffrutescent, branching, two or three feet high, rather sparsely covered and the leaves margined with stipitate glands, the peduncular end of the branches long-hairy, leafy nearly to the top; leaves alternate, somewhat rigid linear-lanceolate, 2-4 cm. long, 4 mm. wide: heads 2 cm. long, rather narrow, outer bracts rather few (8-10) long, and narrow; completely enwrapping the akene, the lanceolate tips spreading, inner bracts about as many united into a cup: rays 15-18 cm. long, broadly linear, bright yellow; akenes of the ray without pappus, glabrous, strongly compressed, striate, slightly falcate-

oblique; disk akenes numerous apparently fertile, striate, nearly glabrous with a pappus of 15-20 stout paleaceous awns 10 mm. long, plumose to the base, equaling the disk flowers and about a third longer than the akenes.

San Antonio, Lower California, on the road between Tia Juana and Ensenada, June 4, 1893. The plant looks much like some of the more glabrous forms of *Aplopappus lincarifolius*.

Hemizonia Parryi Greene. This plant was collected near Cañon Salado with stems of the preceding year remaining attached to the root, showing that it may become perennial.

Hulsea Californica T. & G. Very common on San Pedro Martir. It is much less floccose-woolly than the form from Alta California.

Chænactis Parishii Gray. Common on San Pedro Martir.

Artemisia tridentata Nutt. San Pedro Martir and San Telmo Creek.

Senecio Lemmoni Gray. Vallederos Creek.

Senecio Californicus DC. Colnett.

Cnicus Drummondii var. *acaulescens* Gray. Common about the wet meadows of San Pedro Martir.

Cnicus Californicus Gray. San Pedro Martir.

Hieracium Brandegei Greene. San Pedro Martir. Agrees with the typical specimen excepting that the pappus is longer.

Taraxacum sp. San Pedro Martir; perhaps introduced.

Arctostaphylos Pringlei Parry. San Pedro Martir. Blooming later and more viscous, with redder bracts and flowers than the other species.

Arctostaphylos glauca Lindl. San Pedro Martir. Very abundant.

Sarcodes sanguinea Torr. Not uncommon on San Pedro Martir.

Frasera albomarginata Watson. San Pedro Martir.

Frasera Parryi Torr. San Pedro Martir.

Gilia bella Gray. San Pedro Martir.

Gilia inconspicua Dougl. San Pedro Martir.

Gilia floccosa Gray. Slopes of San Pedro Martir.

Gilia atractyloides Steud. San Telmo.

Phacelia circinata Jacq. San Pedro Martir.

Nama Parryi Gray. San Pedro Martir.

Eriodictyon angustifolium Nutt. San Pedro Martir.

Eriodictyon sessilifolium Greene. is common in many places in the northern peninsula. Mr. Greene was mistaken in crediting it to Alta California, for Mr. J. M. Hutchings, the earliest recorded collector, states that the label quoted * by Mr. Greene is an error and that the specimen was collected between Ensenada and Tia Juana.

Convolvulus occidentalis Choisy. Slopes of San Pedro Martir.

Solanum Xanti Gray. San Pedro Martir.

Aphyllon fasciculatum Torr. San Pedro Martir.

Pentstemon centranthifolius Benth. San Pedro Martir.

Antirrhinum Nuttallianum Benth. San Pedro Martir.

Cordylanthus Kingii Watson. San Pedro Martir.

Mimulus Palmeri Gray. Very abundant on San Pedro Martir.

Mimulus Fremonti Gray. Hills at foot of San Pedro Martir

Mimulus brevipes Benth. Near Vallederos.

Mimulus cardinalis Dougl. San Pedro Martir.

Limosella aquatica L. San Pedro Martir.

Monardella linoides Gray. San Pedro Martir.

Acanthomintha ilicifolia Gray. Hills about San Telmo.

Audibertia incana Benth. var. *pachystachya* Gray. San Pedro Martir.

Stachys ajugoides Benth. San Pedro Martir.

Brunella vulgaris L. San Pedro Martir. This appears again in the Cape Region Mountains.

Monarda macrantha var. *tenuiflora* Gray. San Pedro Martir.

Rumex salicifolius Weinm. San Pedro Martir.

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* Bull. Cal. Acad. i, 201.

Polygonum amphibium L. San Pedro Martir.

Eriogonum Wrightii Torr. San Pedro Martir.

Platanus racemosa Nutt. Slopes of San Pedro Martir.

Phoradendron juniperinum var. *Libocedri* Engelm. Growing on *Libocedrus decurrens.*

Phoradendron Bolleanum Eichl. Growing on *Cupressus Guadalupensis.*

Arceuthobium occidentale Engelm. On *P. ponderosa.*

Euphorbia Palmeri Engelm. San Pedro Martir. The specimens show the gland erose rather than crenate. It is common and usually yellow with a conspicuous Æcidium.

Populus tremuloides Michx. San Pedro Martir. Found growing in several places.

Quercus agrifolia Née. Base of San Pedro Martir, Santa Cruz Creek. Very large trees.

Quercus Wislizeni A. DC. San Pedro Martir, in the form of large bushes.

Quercus chrysolepis Liebm. Common on San Pedro Martir.

Quercus grisea Liebm. Very abundant on the higher elevations of San Pedro Martir.

Quercus dumosa Nutt. Hills near San Telmo.

Sisyrinchium bellum Wats. San Pedro Martir.

Smilacina stellata Desf. San Pedro Martir.

Juncus triformis var. *uniflorus* Engelm. San Pedro Martir. Sometimes so abundant as to redden moist ground. The specimens are all dimerous and even smaller than those noted by Dr. Engelmann.

Epicampes rigens Benth. San Pedro Martir.

Elymus Sitanion Schult. San Pedro Martir.

Juniperus Californica Carr. This large bush or small tree is common on the hills about the base of San Pedro Martir and has been collected much farther south.

Cupressus Guadalupensis Watson. San Pedro Martir. Seen in but one locality.

Abies concolor Lindl. San Pedro Martir. Very few trees seen.

Pinus Lambertiana Dougl. San Pedro Martir. Not abundant.

Pinus Parryana Engelm. Common at the lower elevations of San Pedro Martir.

Pinus ponderosa Dougl. var. *Jeffreyi* Engelm. San Pedro Martir. The most abundant tree of the plateau.

Libocedrus decurrens Torr. San Pedro Martir. Not common.

Polypodium vulgare L. San Pedro Martir.

Pellæa Ornithopus Hook. San Pedro Martir.

Asplenium septentrionale Hoffm. San Pedro Martir.

Woodsia Oregana Eaton. San Pedro Martir.

Woodwardia radicans Smith. San Pedro Martir.

PERITYLE ROTUNDIFOLIA (Benth.) *Amauria rotundifolia* Benth. Bot. Sulph. 31; *Perityle Fitchii* Torr. Pac. R. Rep. iv,, 100; *Laphamia peninsularis* Greene Bull. Cal. Acad. i, 8. Through the courtesy of Mr. W. Botting Hemsley of the Kew Herbarium, who has very kindly furnished us a few akenes of the type, the longdoubtful genus Amauria disappears at last from our flora. Exploration of the Peninsula of Baja California has in recent years been prosecuted to so considerable an extent, that the existence at a place so well known as San Quintin of a generic type not found by subsequent botanical visitors had become improbable, and attention was called to its possible identity with some known plant. It has not, so far, been found north of San Quintin.

The shape of the akenes, rendering it a somewhat aberrant Perityle, is responsible for the circumstance of its having been named in three different genera. The specific name *rotundifolia* is much the earliest, indeed Perityle has over Amauria precedence rather than priority. Like most of the other species the flowers of *P. rotundifolia* seem to be largely unfertilized, the akenes of the greater number being white and inane.

T. S. B.

FLORA OF BOULDIN ISLAND.

BY KATHARINE BRANDEGEE.

In the centre of the great valley of California, where all its waters meet at what was once the deepest part of the immense lake contained by the encircling rim of mountains, there is a large area embracing many hundreds of square miles which is but little above the level of the sea. This meeting of the waters is a labyrinth of tortuous channels embracing green islands of all sizes, from the islet of a few rods, not yet firmly anchored and rising and falling with the tide, to such bodies of land as Grand and Sherman Islands many miles in length and breadth. Through the winding channels the river steamers and fishing sloops pick their way with ease, though the traveler, seeing them for the first time, becomes completely bewildered. The islands are all of the same formation, a pure and exceedingly fine vegetable mold arising from the decay of countless generations of "Tule" and without trace of sand or gravel. They are all either entirely or in great part below the level of the water, and in order to be habitable must have strong levees watched and maintained with sedulous care. The unleveed islands often have cattle pastured upon them, even in cases where the sod is so thin that the animals spend a considerable part of their time scrambling out of the ooze, into which the breaking of the crust has let them fall. The vegetation, however, though of a lush and vivid green, is coarse, and cattle do not at first thrive very well upon it.

Of those enclosed by levees and in cultivation, Bouldin Island is a good example and is of more interest to botanists than any of the others, for upon it, in the autumn of 1872, Mr. C. D. Gibbes collected the plants described by Dr. Kellogg in the Proceedings of the California Academy of Sciences under the names of *Hibiscus Californicus*, *Erigeron discoidea*, *Solidago elongata* var. *microcephala*, *Helianthus giganteus* var. *insulus* and *Hedeoma purpurea*. The island has an area of about a dozen square miles and is owned by four men, who lease the lands on shares to Italians, Portuguese and Chinese. It is surrounded by the Mokelumne River and its sloughs. The levee is built of clay dredged from

the bottom of the river, and is added to year by year, as it is constantly sinking. Both sides of the levee are fringed with a dense growth of willows, alder, and the ever present "Tule." The land slopes to the centre and is irrigated by means of guarded openings in the levee, care being taken not to admit an undue quantity of water. The island is dry on the surface for the most part, although the water is but a short distance beneath, and the winds often raise the light loam from the roads in swirling clouds of dust. The ground shakes very perceptibly from the passing of wagons, and in many places even from a footstep, a peculiarity which is somewhat unpleasant until custom has rendered it familiar.

The natural flora of the islands embraces but few species as would naturally be expected from the sameness of environment. It consists besides the prevailing "tules"—*Scirpus lacustris* and *S. Tatora*—in great part of *Psoralea macrostachya*, *Epilobium holosericeum*, *Solidago occidentalis* and *S. elongata*, *Baccharis Douglasii*, *Helianthus Californicus*, *Artemisia vulgaris*, *Apocynum cannabinum*, *Convolvulus Sepium*, *Stachys albens*, *Polygonum Hartwrightii*, *Urtica holosericea*, *Alnus viridis*, *Salix longifolia* & *S. sessilifolia*, *Typha latifolia*, *Cyperus erythrorhizos*, *Phragmites communis*, etc. The leveed islands abound in weeds as may be seen from the list appended. Their luxuriance in most cases far exceeds anything seen on the mainland, and the species are usually well diffused. The vegetation is late, the time of fullest flowering being in August and September.

The entire absence of many of the large genera and even families of Californian plants of the not distant mainland is very noticeable. *Ranunculus aquatilis* is the only plant belonging to that family to be expected, and even that has not been collected on Bouldin Island. There are no Caryophyllaceæ except a stray *Silene Gallica* or *Stellaria media*, no violets, no Saxifragaceæ, no Hydrophyllaceæ, no Polemoniaceæ except an occasional recently immigrated *Gilia squarrosa*, not a single Hemizonia or Eriogonum, and no plant belonging to the Orchidaceæ, Iridaceæ, or Liliaceæ, unless *Lilium pardalinum* should be found to occur in some places.

The list below is the result of a visit to Bouldin Island, Sep-

tember 6 and 7, 1892, and of a single day early in July of the present year. An inspection of other islands would undoubtedly add other introduced plants not yet known to our flora. It is not intended to be complete even for the flowering plants and ferns, but is approximately so. Those which are credited to our flora for the first time are marked *. There remain as yet unidentified several which are plainly not native.

Brasenia peltata Pursh. The Slough in the centre of the island.

Nuphar polysepalum Engelm. The same locality.

Sisymbrium officinale Scop.

Nasturtium curvisiliqua Nutt.

Capsella Bursa-Pastoris L.

Silene Gallica L.

Stellaria media L.

Portulaca oleracea L.

**Hypericum mutilum* L.

Hibiscus lasiocarpus Cav., *H. Californicus* Kell. About the banks of levees and sloughs. There seems to be no reason to consider it indigenous.

Malva parviflora L.

Trifolium repens L. Very common. *T. pratense* is one of the staple crops.

Melilotus parviflora Desf.

Medicago sativa L.

Hosackia subpinnata T. & G.

Psoralea macrostachya DC.

Lathyrus venosus var. *Californicus* Wats.

Rosa Californica Ch. & Schl.

Rubus ursinus Ch. & Schl.

Potentilla rivalis Nutt.

Lythrum albicaulis Bert., *L. Sanfordi* Greene.

Jussiæa repens L.

Epilobium holosericeum Barb.

Epilobium Franciscanum Barb.

Epilobium paniculatum Nutt.

Œnothera biennis L.

Hydrocotyle prolifera Kell. Very abundant and fruiting in great profusion.

Apium graveolens L. Not common as it is about the borders of the Suisun Marsh.

Œnanthe sarmentosa Nutt.

Cicuta Bolanderi Wats. Often ten feet high or more.

Cephalanthus occidentalis L.

Galium trifidum L.

Solidago elongata Nutt. Six to nine feet high with a pyramidal panicle one to two feet long and half as broad.

Solidago occidentalis Nutt. Of great size and luxuriance—perhaps the most abundant composite of the island.

Aster Douglasii Lindl.

Conyza Coulteri Gray, *Erigeron discoidea* Kell. Frequent but not abundant.

Baccharis Douglasii DC.

Pluchea camphorata DC.

Gnaphalium palustre Nutt.

Ambrosia psilostachya DC.

Xanthium strumarium L. Abundant, probably brought in by sheep which are ferried from the mainland to the stubble fields in September.

Xanthium spinosum L. Less abundant than the last.

Helianthus Californicus DC. *H. giganteus* var. *insulus* Kell. Ten to fifteen feet high.

Bidens chrysanthemoides Michx. Common about the ditches.

**Bidens frondosa* L. Very abundant about the roadsides.

Matricaria discoidea DC.

Artemisia vulgaris L.

Senecio vulgaris L.

**Cnicus lanceolatus* Hoffm. Abundant and the only thistle observed on the island.

Centaurea Melitensis L.

Lactuca scariola L. Becoming common about the landings and roadsides.

Anagallis arvensis L.

Apocynum cannabinum L.

Asclepias Mexicana Cav. Infrequent.

Heliotropium Curassavicum L.

Convolvulus arvensis L. Abundant.

Convolvulus Sepium L. Common about the levees and banks of sloughs and about the marshy borders of the Sacramento and San Joaquin Rivers. The early flowers appear to hardly ever set their seeds.

Cuscuta arvensis Beyr. Abundant.

Solanum nigrum L.

Scrophularia Californica Cham.

Mimulus luteus L.

Veronica Americana Schwein.

Utricularia vulgaris L. Central Slough near the schoolhouse in company with *Brasenia peltata*, etc.

**Mentha pulegioides* L. Occasional, occurring also near the county road at Paradise Cut about four miles from Lathrop.

Hedeoma purpurea Kell. changed by Dr. Gray in Bot. Cal. to *Micromeria purpurea*, proves to be *Mentha Canadensis* L. Dr. Kellogg's type is at Harvard. It is one of the rank abundant plants of the island.

Lycopus sinuatus Ell. In several forms.

Lycopus lucidus var. *Americanus* Gray.

Nepeta Glechoma Benth.

Scutellaria galericulata L.

**Scutellaria lateriflora* L.

Stachys ajugoides Benth.

Marrubium vulgare L.

Stachys albens Gray. Abundant and often very tall.

Lippia lanceolata Michx.

Verbena hastata L. Very abundant and tall—five to eight feet high.

Plantago major L.

Plantago lanceolata L.

Rumex maritimus L.

Rumex conglomeratus Murray.

Rumex crispus L.

Rumex obtusifolius L.

Polygonum amphibium L.

Polygonum Hartwrightii Gray. Extremely abundant and of rank growth.

Polygonum punctatum Ell.

Polygonum lapathifolium L. Very abundant.

Polygonum aviculare L. Common.

Polygonum Convolvulus L.

Amarantus albus L.

Amarantus retroflexus L.

**Amarantus chlorostachys* Willd.

Amarantus. Not yet determined.

Chenopodium ambrosioides L.

Chenopodium album L.

Urtica holosericea Nutt.

Alnus incana Willd. var. *virescens* Wats. About the levees and along the overflowed margins of the streams as far down as Antioch.

Salix longifolia Muhl.

Salix sessilifolia Nutt. var. *Hindsiana* Anders. The two common willows of the islands. In September, on Bouldin Island, they, as well as all the other trees, are half covered and disfigured by the great webs of a tent caterpillar *Hyphantria textor*.

Populus Fremonti Watson. Not common.

Asparagus officinalis L. A considerable part of the acreage of Bouldin Island is devoted to the cultivation of this plant. It is becoming abundantly naturalized, as might be expected from the profusion of seed.

Typha latifolia L.

Lemna trisulca L.

Lemna minor L.

* *Speirodela polyrrhiza* (L).

Alisma Plantago L.

Sagittaria sagittafolia L. var., *S. Sinensis* Sims. The Chinese plant this for its edible tubers, and it has escaped and is thoroughly at home in nearly all the marshy lands of the Sacramento and San Joaquin. It ripens a very large number of seeds, which are widely disseminated by the waters.

Juncus effusus L.

Juncus xiphoides Meyer.

Cyperus erythrorhizos Muhl.

Scirpus lacustris L.

Scirpus Tatora Kunth.

Scirpus Olneyi Gray.

Eleocharis palustris R. Br.

Carex. Not determined.

Panicum Crus-galli L. The most common grass.

Setaria glauca Beauv.

Phleum pratense L.

Phalaris Canariensis L.

Polypogon Monspeliensis Desf.

Agrostis alba L.

Agrostis scabra Willd.

Agrostis verticillata Vill.

Holcus lanatus L.

Phragmites communis Trin.

Lolium perenne L.
Hordeum murinum L.
Equisetum arvense L. Abundant on the clay of the levee.
Woodwardia radicans Smith.
Asplenium Filix-foemina Bernh.
Aspidium rigidum var. *argutum* Eaton. Ferns were observed only about the levee.

Mosses, Liverworts and Lichens are conspicuous only by their absence, but fungi — parasitic on living plants — abound.

THE SPECIES OF AMBLYCHILA.

[With Plates xxviii, xxix.]

BY J. J. RIVERS.

Are there three species of Amblychila, or two, or only one? Having before me the three forms that have received names, and having also Say's and Reiche's descriptions and also Thomson's "Monographie des Cicindelides" together with my description of *Am. Baroni*, I am well prepared as far as material is concerned to give a resumé of the luckless paths into which *Amblychila cylindriformis* Say, *A. Picolominii* Reiche, and *A. Baroni* Rivers have been made to travel.

In 1823 Say published his description of *A. cylindriformis;* in 1839 another form which belonged to the Dupont collection was described and figured under the name of *A. Picolominii* Reiche. This insect was said to have been found near the bay and port of San Francisco, California, in latitude forty-eight degrees north. The locality is considered altogether an erroneous citation, as San Francisco, Cala. is in thirty-seven degrees, forty-seven. The difficulty in the way of coming to an agreement in the identification of these insects is the fact that both our most learned coleopterists have pronounced Dupont's examples to be *A. cylindriformis* of Say, while Reiche and Chaudoir consider them or some of them as a distinct species.

There appears much confusion concerning the identity of *A. Picolominii.* Thomson's monograph gives a copy of the

description and a figure from Dupont and Reiche, but calls it *A. cylindriformis* of Say, though neither the description nor the figure agrees with it. I fear that the author of the "Monographie des Cicindelides" must have been influenced by reading the opinions of our two great coleopterists and copied the description and the figure of Dupont and Reiche without review. Look at the figure on plate 3, fig. 3 in Thomson's Monograph and guess what induced the author to call it *A. cylindriformis* Say. The two species are abundantly distinct and I feel certain that such eminent men as Le Conte and Horn have not been shown the insect that furnished the figure illustrated in Thomson's Monograph. Dr. Horn recently wrote me that the French coleopterists considered my *A. Baroni* as a small example of *A. Picolominii.* I had already begun to be of that opinion, and after further consideration I must own that the French opinion is the correct one. I hold that there are two species, viz.: *Amblychila cylindriformis* Say* and *Amblychila Picolominii* Dupont Collection, Pl. 19 fig. 1 à 6 and Reiche† and that *Amblychila Baroni* Rivers is the male of *A. Picolominii.*

It appears to be an impossibility for anyone to write a correct history of *Amblychila* and formulate a reliable description, or at least one that will meet with the approval of the coleopterological fraternity. The description by Say is rather terse, there being an omission of the very coarse and distinct punctuation of the apex of the elytræ. Reiche seems to have done some bad work also, for his *Picolominii* is said to have these coarse puncturings on the apex of elytra, showing that he must have had both species under examination, for the examples from Arizona are impunctate at the apex of the elytra. Reiche says: "*de gros points irregulièrement placés à la base et à l'extrémité des élytres.*" The third form, which I recently received from Peach Springs, Northwestern Arizona, and which I take to be Reiche's *Picolominii* and the species named *Baroni* from Southern Arizona, both have elytral apices free from points or punctures. So that Dr. Horn and others must have some other reasons for

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* Trans. Amer. Ent. Soc. Vol. x Proceed. p. iv.

† Annales S c. Ent. de France p. 557, 1839.

considering the Dupont specimens as those of the Texan form of *cylindriformis*. But what are we to do with the great bulk of the description by Reiche, which does not fit *cylindriformis* Say; and what with the figure in Thomson, which is a good portrait of my recent addition from Arizona? In the description of *A. Baroni* a glaring mistake was made in sex, calling the example a female when it should have been recorded as a male, as a subsequent examination proved it to be.

Say's description may be taken as fairly good. His application of the name is also good, as it would be applicable. The form is subcylindric or subquadrate, but neither of these terms would be appropriate to either of the other species or forms, because they are wider than deep, and altogether flatter insects.

DESCRIPTION: Form gracefully elongate-oval. Above wholly shining black with high polish. Beneath also shining black. Head subquadrate; clypeus with the usual marginal punctures; behind the clypeal suture are two punctures widely separated; behind the second or frontal suture are two punctures as in *A. Baroni* but there are about ten or twelve other punctures differing both in number and position from those seen in *Baroni*. Thorax strongly convex; longer than wide as observed from above; broad across the front and produced in the middle; much narrowed behind; from the front angles runs a well defined raised continuous marginal line which extends along the lateral and basal margins; an uneven longitudinal central impressed line begins infirmly on the basal margin and ceases about where the arcuate impressed line crosses the fore part of the disc. Elytra twice as long as wide; much flattened on the central area; two-thirds from sutural line arises a well-defined carina, it is high and sharp, beginning at the base and ending abruptly one-fourth from the apex. A raised line just as bold as the carina runs nearly parallel to it, but beginning a little short of the base and ending firmly and nearer the apex than does the carina, this line is punctured at wide intervals and becomes slightly serrate at the base. Another raised line, which might be termed the acute margin, begins on the basal angle but does not reach so near to the apex as the other line or the carina; this line is strongly mucronate and at the basal angle it becomes

strongly serrate. The central area forming the disc inside the carinæ has at the base on each side of the suture four broken rows of muricate punctures, which are reduced to two rows at the middle, then reduced to one row and entirely obsolete before reaching the apex. In the space between the carina and the first raised line are alternate rows of muricate punctures, beginning at the base with two and increasing to four rows apically, but all becoming obsolete on the apex. Between the first and second line, the space is occupied by two or three rows of muricate punctures; between the second line and the real margin are from two to four rows of the same kind of punctures as before mentioned, but on the epipleural portion near the apex are some minute punctures without points, spines, or mucrons or bristles, but all the other punctures carry a bristle or stiff hair.

The reasons for considering this species *Picolominii* Reiche are numerous. It agrees in the main with the descriptions by Reiche and Thomson and also with the latter's figure though by some oversight he calls it *cylindriformis* Say, while it is a good portrait of the insect described above. Reiche says: "The only specimen I ever saw was a female." Now what has become of that insect or where is the specimen that furnished Thomson with his figure? The reasons for considering *Baroni* as the male of *Picolominii* are: It is of the same color, has the same kind of puncturing, and is wanting only in carina and complete raised lines; these, however, can be traced by close analysis. At the base of the elytra in *Baroni* the beginnings of raised lines are visible and the method of their formation is plainly discernible. The spines on the front margin of the punctures being depressed and fused into a continuous line by contact with their nearest neighbors, the keel formation begins. This is easily traced in *Baroni* but it being the male form there is not the same necessity for keels and carinæ as there is in the female, of which sex *Picolominii* seems to be. *Cylindriformis* Say has little relation as a species to *Baroni* or *Picolominii*; the coloring and the style of ornamentation differ. In the former species the elytra are usually brownish, but in the latter black is the color. In the former two kinds of punctural markings are always present while in the latter there is but one uniform style.

Cylindriformis Say (not of Thomson) is closely punctured all over the elytra with large and small punctures on a rugulose ground. *Picolominii* and *Baroni* have but few punctures, far apart on a smooth ground and flat surface. The number of punctures in each species should be noticed: in *cylindriformis* there are about 230—240 on the central or sutural line and near the suture there are about 40. In *Picolominii* the whole number in the same area does not number over 40, while near the suture there are but three or four. On the deflexed portion of the elytra and covering the apex, large punctures occupy all available space. On the same part in the other species the apices are smooth.

Cylindriformis.

Length, 30 m.m.; color, brownish; surface of elytra rugulose and irregularly punctate; apex of elytra very coarsely punctured.

Picolominii.

Length, 25 m.m.; color, deep black; surface of elytra smooth and regularly punctate; apex of elytra with punctures scarcely visible.

Locality Peach Springs, Truxton Valley, N. W. Arizona. Altitude, 5000 feet.

Peach Springs is about sixty miles from the nearest boundary line of Nevada, and about eighty miles from the Californian state line. The regions traversed by the Colorado of the west and its western tributaries seem to be the habitat of *Picolominii.* The original statement that it was found near the Port and Bay of San Francisco, in New California, is presumably a mistake. The confusion may have arisen from copying from the ship's log, which gave the final clearing from the western coast as the port above cited. But I think that Picolomini went up the Bay or Gulf of California, and then followed the course of the Colorado and Gila Rivers. What suggests such a course is the fact that *Baroni* was found on the Gila and the *Picolominii* on the Colorado, and possibly Picolomini took his example a ♀ in the San Francisco Mountains.

The original description of *A. Picolominii* is appended.

AMBLYCHILA PICOLOMINII Dupont Collection. (Voyez Pl. 19, fig. 1 à 6.)

Longueur 28 millim. largeur, 9 millim.

Ater, nitidus; capite laevigato; thorace subquadrato, laevigato subcanaliculato; elytris obsolete punctulatis, lineis tribus elevatis; interstitiis, puncte profunde impressis.

FŒMINA. Corps entièrement d'un noir brillant, poli.

Tête, lisse; deux enfoncements larges peu marqués, entre les yeux; deux points enfoncés au-dessus de chaque orbite.

Epistome, lisse; un gros point enfoncé de chaque côté.

Labre, lisse; de gros points enfoncés le long de sa marge; ces points, comme ceux des orbites et de l'épistome, servant d'insertions à des poils raides.

Antennes avec quelques poils rares; leur quatre premiers articles d' un brun noirâtre; les autres obscurs, pubescents.

Palpes, d'un brun noirâtre, avec l'extrémité de chaque article un peu clair.

Corselet aussi long que large, avec quelques rides transverses très fines; deux impressions anterieures, arquées, parallèles, obsolètes, et une autre droite, encore moins marquée le long du bord postérieur.

Elytres, presque le double plus large que la base du corselet, ovales, allongées, couverts de très petits points enfoncés presque effacés; carène effacée à son extrémité, n'atteignant que les *cinq sixièmes de la longueur de l élytre;* une ligne élevée, aiguë, aux deux tiers du disque de l'élytre, vers la carène; une autre au tiers de l'épipleure, toutes deux plus courtes que la carène; une première série longitudinale de gros points enfoncés sur la disque, allant jusqu' à l'extrémité de l'élytre; une seconde semblable dans l'intervalle de la première ligne élevée et de la carène, et une troisième dans l'intervalle de la carène et de la seconde ligne élevée: celle-ci, comme la carène, crénelée par des points enfoncés très serrés; de gros points irregulièrement placés à la base et à l'extrémité des élytres, et les épipleures couvertes de points semblables plus rapprochés; la plupart de ces points, précédés d'un petit point élevé, servant d'insertion à un poil raide. En dessous les segments de l'abdomen lisses, avec quelques gros points enfoncés de chaque côté.

Pattes couvertes de poils noirâtres.

Le seul individu que j'aie vu de cette espèce est une fémelle: M. Dupont l'a dédié à M. Picolomini, qui l'a trouvé au port ou baie de Saint Francisco, dans la Nouvelle-Californie [sic] sous le 48^{e} degré environ de latitude septentrionale.—*Annales de la Soc. Entom. de France, Tome 8, 1839 p. 560–561.*

GENERAL BIRD NOTES.

EDITED BY WALTER E. BRYANT.

LECONTE'S THRASHER (*Harporhynchus lecontei*) WEST OF THE SIERRA NEVADA.

On March 10 of this year I was at Onyx, just above the junction of the north and south forks of the Kern River, in a valley characterized by desert vegetation—cholla, sage and Spanish

dagger. While collecting through this growth, I heard the very well-known notes of Leconte's thrasher and found the author; but as is generally the case with this species, a bird seen is by no means in the cabinet. After chasing him for several minutes I got a long-range snap-shot, but lost him. Later I heard one or more others, but they could not be secured.

A. W. ANTHONY.

[In North American Fauna No. 7, Part II, Leconte's thrasher is recorded from the San Joaquin Valley, near Buena Vista Lake, upon the observations of Mr. Nelson. The maps which are published show that the distribution of the creosote bush (*Larrea tridentata*) and the northern distribution of Leconte's thrasher are almost exactly co-extensive.—W. E. B.]

VAUX'S SWIFT AT REDWOOD CITY.

On June 25, 1893, Mr. C. Littlejohn of Redwood City collected a pair of these birds which had been seen about the town on several occasions, probably the same individuals, as none have been seen since that date. The first appearance of the species was in the fall of the previous year, when two or three were seen. In reply to a letter of mine, Mr. Littlejohn writes: "I too thought the swifts had been living in a chimney, and as I had never seen a chimney swift I thought these might be a pair of them that had found their way out to California. When they were taken they had a strong smoky smell, which they still retain in a less degree. I think the odor was too strong to come from any charred tree, as you suggested, and it reminded me strongly of the smell of an Aleut's hut in Alaska. The female was probably not nesting at the time."

Vaux's swift is an irregular summer resident of Sebastopol according to Mr. F. H. Holmes.

W. E. BRYANT.

NOTE ON THE NESTING OF SAMUEL'S SONG SPARROW.

At Redwood City as at Haywards, Samuel's song sparrow is confined during the breeding season to the salt marsh, where it begins nesting early in March and has its young reared before the high tides in the latter part of May or first of June would interfere. This season I found them with young in the latter part of June in the woods and at the base of the mountains

about five miles from the marsh, which led me to believe that there, in limited numbers at least, they reared a second brood which they ordinarily could not do on the marsh for the reason mentioned above.

C. LITTLEJOHN.

MONGOLIAN PHEASANTS OF OREGON.

The birds (*Pasianus torquatus?*) were introduced into the country by Hon. O. N. Denny, U. S. Consul-General at Shanghai, China, in 1882. There were something less than sixty birds, and they were turned out on an island in the Willamette River, but have since been scattered around in different localities. Mr. Denny also introduced the Golden Pheasant (*Chrysolophus pictus*) which I think have died out. An act to protect them was passed on October 24, 1882, and has since been renewed and is still in force, although almost a dead letter now.

The pheasants thrive best in the southern counties. They are not more destructive to crops than any other game birds.

BERNARD J. BRETHERTON.

A MIGRATION OF BONAPARTE'S GULL.

On May 11, 1889, I observed several flocks of Bonaparte's gull (*Larus philadelphia*) flying down this (Pajaro) valley, westward toward the ocean, and they flew every night till the first of June. They commenced flying about seven o'clock, if foggy, or half-past seven if clear, and would fly till dark. The flocks had from five to fifty or more birds in each. Some nights flock after flock would go by and then again four or five flocks would be all I could count in an evening. The first flocks seemed to be old birds with black heads, and a few days later all the birds shot were in young or winter plumage. The stomach of one of the birds which I shot contained a piece of gravel and what looked like parts of black insects. Later I examined another which was full of whitish worms about three-fourths of an inch long and as large as a number fourteen wire.

I do not know why the birds should come down this valley or where they came from, but suppose they were migrating and had come from the San Joaquin River.

J. R. CHALKER.

Wilson's Phalarope Breeding in California.

Yesterday [June 16, 1889] I was at the south end of Lake Tahoe and waded the swamp. I found a phalarope's nest but the eggs were hatching. An egg which was pipped looked almost exactly like a spotted sandpiper's egg—I could not have told the difference. The young, which were two in number, were quite dark buff with a black stripe from the top of the head to the tail, a small black stripe where the tail should be, three black dots on each side of the body and a black dot on each wing and side of head. The legs must have been two inches long and the feet nearly an inch, the latter as near as I can remember were of a lead color; the bill was about half an inch long. The old ones came quite close to me, flying about and uttering that peculiar quack of theirs.

Walter D. Bliss.

The Bohemian Waxwing in California.

The only record of the occurrence of the Bohemian waxwing (*Ampelis garrulus*) in this State, I believe, is that of a straggler taken by Dr. Cooper at Fort Mohave on January 10, about twenty-three years ago. The bird is probably only a winter visitant and the lack of winter observations in the high Sierra accounts for it not being better known.

The Academy of Sciences has six specimens which were sent in the flesh from Susanville by Mr. T. B. Sanders. Two were collected on February 2, 1892, and the other four on February 17.

W. E. Bryant.

A MESQUITE TINEID WHICH CONSTRUCTS A BAG-LIKE CASE FROM THE LEAVES.

BY C. H. TYLER TOWNSEND.

On May 15, 1891, I found two case-worms on mesquite (*Prosopis juliflora*), on the mesa to the east of Las Cruces, New Mexico. The larger case measured over 20 mm. in length. On May 31, 1891, the mesquite bushes on the mesa, for a mile to the east of town, were well stocked with the cases of this larva, the majority of the bushes having numbers on them. On May 13, 1892, they were again observed to be very plentiful on the mesquite in the same locality. A moderately small and rather

slender black and yellow hornet was found on this date pulling one of the larvæ out of its case.

The cases of this species are constructed of little leaflets of the mesquite, fastened together longitudinally with silk into an irregular, more or less tubular bag-like case, so as to protect the larva inside. The leaflets which compose the case are always more or less eaten along the midrib, but not entirely through. The cases bear considerable resemblance to those of *Psyche confederata*. Hanging perpendicularly from the leaves while the larvæ are feeding, they give the mesquite bushes the appearance of being hung with miniature bag-worms.

Some of the larvæ in their cases were sent to Dr. Packard. They reached him as pupæ. From one of these an imago appeared, which Dr. Packard wrote me was "an unknown tineid." I am unable therefore to suggest the genus to which it belongs.

Description of larva. Length, 9 to 12 mm.; width anteriorly, nearly 1⅓ to 1½ mm. White; head black, somewhat polished, with a slight reddish area on each side dorsad of eyes; prothoracic segment with dorsum brownish black, except a median longitudinal whitish dividing line. Consisting of thirteen segments; appearing from above as though possessing two extra ones, since the two terminal segments each bear a transverse suture or wrinkle on dorsum. Head and prothorax about equal in width; third segment distinctly wider, segments 4 to 6 nearly same width as 3, 7 and 8 very gradually narrowing, 9 to 11 about or hardly as wide as 8, 12 and 13 gradually narrowing from 11, 13th segment a little more than one-third width of 3d. Head usually not retracted, a little wider than long; prothoracic and third segments a little shorter than head, 4 about as long as head, 5 slightly longer, 6 and 9 to 11 a little longer than 5; 7, 8, 12 and 13 about as long as 5. Head and prothorax chitinous, rest fleshy. Head subhemispherical, convex dorsally, with a few fine hairs on anterior border, and several on dorsum; all the other segments with a number of hairs (about ten) arising from minute papillæ, four usually being dorsal, the others lateral and ventral. Eyes consisting of six small but prominent bead-like glassy

white simple eyes, each with a minute pupil-like black dot; four arranged in nearly a semi-circle, with the exterior or convex side dorsad; the other two situated ventrad of the front one in the semi-circle, one anterior to the other. Labrum rather deeply notched anteriorly, light fulvous; adjoining border of clypeus narrowly concolorous. Antennæ sunken in a small excavation anterior to eyes, apparently two-jointed, joints about equal in length, second hardly narrower and terminated with a style-like hair. Mandibles rather stout, subquadrate in outline, flattened, faintly four-notched, therefore faintly serrate with four or five teeth. Maxillæ and labium whitish; maxillary palpi apparently two-jointed, basal joint stouter, terminal joint more elongate and slender. Three pairs of four-jointed true legs on the thoracic segments, terminated by a brownish chitinous claw. Five pairs of prolegs, on joints 7 to 10, and 13, the anal pair stouter, fleshier, and somewhat longer.

Described from two alcoholic specimens, perhaps not fully grown, taken from cases May 13 and 15. Color of head and body noted in life. The length of the segments is drawn from the better preserved specimen. The proportions are slightly different in the other.

BIRDS OF SAN PEDRO MARTIR, LOWER CALIFORNIA.

BY A. W. ANTHONY.

Mr. W. E. Bryant's excellent Catalogue of the Birds of Lower California has left but little to record from the northern part of that peninsula, but the notes furnished by the present writer were necessarily very fragmentary owing to the collections as well as many notes being inaccessible at the time. It is to correct this deficiency and at the same time record the observations of a trip through that region the past season that the present paper is offered. The expedition crossed the national boundary at Tia Juana, fifteen miles from San Diego, on April 17, 1893, and proceeded by easy stages to the western base of San Pedro Martir by way of Ensenada and Colnett. The first benches of the mountain were not reached until May 5.

Several days were spent at various camps between this point (7000 feet) and the gulf slope which was not reached until May 23. The return march was taken up May 27 and San Diego reached June 7.

During our southward march the migration was at its height and at the time that we left the higher parts of the mountain new arrivals were seen almost daily; it is not improbable that among these late arrivals some Sonoran species might have been found had our time permitted a more thorough investigation. It is probable, however, that most of the species inhabiting the pine belt were noted. The region embraced in the name of San Pedro Martir consists of a high plateau of about sixty-five or seventy miles in length by twenty in width, lying about twenty miles from the gulf, and with its greatest extent parallel with that coast. Most of the plateau would be embraced within the limits of 30° and 31° north latitude. The northern end rises to a height, in one or two peaks, of 12,500 feet, estimated, and from that point the ridges and peaks drop away by degrees until at the southern end they merge into the low, barren hills, common to the peninsula at this point. The east and northern slopes, however, are very steep and rocky, with only two or three almost impassable trails, while the eastern side presents along its entire length in many places a sheer precipice for thousands of feet.

A series of large open meadows is found at an elevation of 8000 to 8500 feet, surrounded by rough, rocky ridges and heavy pine timber. These ridges are characteristic of the entire region which is composed of soft, friable syenite, the softer parts of which in crumbling away have left huge masses of gigantic boulders forming ridges, in many cases impassable. A growth of yellow pine, *Pinus Jeffreyi*, covers the ridges and slopes as low as 7000 feet altitude, where it gives place to a belt of scattered piñons, *P. Parryana*, reaching to 6000 feet or less, a growth of Manzanita and Ceanothus covers all of the slopes and ridges where it is too rocky for the pines to obtain a foot-hold, and in many places a small shrub oak was abundant. The streams, which were abundant, were all fringed with willow and a few Aspens were seen in some localities. Arising as this region

does from a sea of barren dry hills and reaching an elevation higher than any point south of Mt. Whitney, California, it is not strange that its fauna should be unusually interesting although its relationship is with that of the northern mountains.

The birds observed in the pine belt were limited as to species, but abundant individually. A few species were limited to certain localities and were not plenty, but as a rule all were generally distributed. The list has been somewhat extended to embrace a few species not belonging to the mountain region, but unless otherwise stated, all species were found on or about the mountain.

The following species are for the first time recorded from the peninsula:

Carpodacus cassini.
Peucæa ruficeps.
Melospiza fasciata heermanni.
Passerella iliaca megarhyncha.
Troglodytes aëdon aztecus.

Phalacrocorax penicillatus. BRANDT'S CORMORANT. In April, 1889, I was told of a cormorant that had been about my camp at Valladares, six miles from the base of San Pedro. A short time afterwards I found its body in the creek. It had evidently strayed from the coast and followed up the stream until, unable to find its way back, it had starved. A single bird of this species, or *albociliatus*, was seen at San Telmo, ten miles from the coast, April 30.

Anas boschas. MALLARD. Quite a number were nesting in the large meadows on top of the mountain when we arrived, May 13. A nest of eggs, on the point of hatching, was found by my brother, W. W. Anthony, May 17; the nest was placed in a hole under a pile of boulders by the side of the stream and very well hidden.

Anas cyanoptera. CINNAMON TEAL. A few pairs were nesting in La Grulla meadows, May 13. In October, 1887, this meadow was visited and large flocks of ducks of several species were found in shallow ponds formed by the early rains. They cannot, of course, winter in this region, as it is subject to

a fall of not less than six feet of snow, according to native testimony. Mr. Bryant has quoted me as reporting *A. carolinensis* at 9000 feet in winter, a mistake due to my own carelessness, probably. The species was found at that altitude in fall, but not above 1500 feet after November.

Plegadis guarauna. WHITE-FACED GLOSSY IBIS. At San Telmo they were usually seen during summer in small numbers about a large marsh above the settlement, and I think they doubtless bred there. Adults and young were shot at San Quintin in October.

Tantalus loculator. WOOD IBIS. In the fall a few wood ibis are to be found in all of the marshes and streams from Ensenada to Santa Maria.

Botaurus lentiginosus. AMERICAN BITTERN. Common in the marshes at Colnett and San Ramon, where it doubtless nests.

Ardea herodias. GREAT BLUE HERON. Common at San Quintin and north of that point, also seen to some extent inland. A colony was found nesting on San Martin Island on April 12. At this date most of the nests contained young, but one set of three fresh eggs were taken.

Ardea candidissima. SNOWY HERON. Very common all along the coast from El Rosario north. I think they nest at San Ramon, as they were seen at that point all summer.

Ardea rufa. REDDISH EGRET. Not uncommon at San Quintin.

Fulica americana. AMERICAN COOT. Coots were seen occasionally along the creek below Valladares in the fall. Young were found at San Telmo as early as April 1. A pair was found nesting on San Pedro in May, 1889.

Recurvirostra americana. AMERICAN AVOCET. Not uncommon at San Quintin, Colnett and Ensenada in fall, only seen, however, about the fresh water marshes.

Actitis macularia. SPOTTED SANDPIPER. One was seen at La Grulla, on San Pedro, May 14. Rather common along the coast.

Ægialites vocifera. KILLDEER. A few were found in all the meadows on top of the mountain.

Orcortyx pictus confinis. SAN PEDRO PARTRIDGE. Since describing this race, I have secured a series of skins from San Diego County, California, that are practically identical with my skins from Lower California, San Pedro and Valladares, thus making it necessary to either ignore the Lower California bird, or to include Southern California in its habitat. I am unable to secure specimens from the type locality at present, and so cannot determine the status of the race beyond a doubt.

A single skin from the collection of the California Academy of Sciences, from Monterey, is slightly darker above and shows a conspicuous rusty edging to several of the secondaries, forming a patch on the closed wing not seen in any of my southern birds.

During the past season partridges were found in abundance all over San Pedro Martir and fresh eggs were taken from the time of our arrival May 5 to the last day, May 28.

In the Gaudaloupe Valley, forty miles south of Ensenada, several Oreortyx were seen in the thick chaparral of Ceanothus, almost down to the coast.

Callipepla californica vallicola. VALLEY PARTRIDGE. In October, 1887, this species was found to be quite common on San Pedro as high as La Grulla 8200 feet. It was again met with in April and May 1889 and the past season, but in comparatively small numbers. Birds taken in May (5th to 25th) contained in several cases eggs ready to be deposited.

Capt. C. E. Bendire, in "Life Histories of North American Birds," has recorded my observations regarding the non-nesting of this species during very dry seasons; this habit was again noticed the past season and under very favorable conditions.

Upon our return trip from the base of the mountain to San Diego the present species was abundant, but it was only in the well-watered valleys that they were paired or that young were seen. The past winter and spring had been unusually dry and in many valleys water was entirely absent and vegetation generally very scant and dry. In such localities quail were all in flocks and those that were shot showed little if any enlargement of the ovaries. Small young were seen at San Telmo, a well-watered valley, on May 30.

Pseudogryphus californianus. CALIFORNIA VULTURE. The first evidence that I found of the occurrence of the condor in Lower California was the finding of a dead bird in Guadaloupe Valley, forty miles south of Ensenada and near the coast; later another carcass was found in the dry barren hills east of El Rosario, about 30° north, which was the most southern point where positive evidence of its occurrence was obtained. My brother, W. W. Anthony, reported seeing these birds at one time near Real Del Castillo in the San Rafael Valley.

On San Pedro Martir they are of rather common occurrence, being seen daily about the meadows at altitudes of 8000 and 9000 feet. The Indians told me that their nests were to be found on the high cliffs of the gulf slope and others informed me that they built in the tops of large pines.

I greatly doubt the last statement, however. Every Indian and Mexican gold miner is provided with from one to six of the primary quills of this species for carrying gold dust, the open end being corked with a plug of soft wood and the primitive purse hung from the neck by a buckskin string. All of the dead birds that I saw in Lower California had been killed for their quills alone.

Cathartes aura. TURKEY VULTURE. Common during the summer all over the mountain, usually seen in company with the condor and raven.

Parabuteo unicinctus harrisi. HARRIS'S HAWK. Through some mistake my notes on this species were included under the head of *Buteo lineatus elegans* in Mr. Bryant's list. During the last season Harris' hawk was seen in one or two valleys between Ensenada and Colnett, and in one or two places on San Pedro as high as 7000 feet. It was nowhere common, however.

Buteo borealis calurus. WESTERN REDTAIL. Very common throughout the northern part of the peninsula, and found nesting in abundance in the pines on San Pedro. Nearly all of the pairs seen last spring consisted of one very light colored and one melanistic bird. At La Grulla a pair of redtails were nesting near our camp. The male was a very light bird, while the female was so dark as to be several times mistaken for the dark

phase of *swainsoni*. On May 16 the female was shot as she rose from the nest, and on skinning her I found in her stomach the remains of a *Cyanocephalus* and a nearly complete rattlesnake that must have measured over two feet in length. On the following day the male was seen flying about the nest with another female fully as dark as his former mate, and I was surprised to see her feeding young ten days or two weeks old. I had supposed the nest still contained eggs. As it was such a clear case of adoption I concluded to leave them undisturbed, but the unfortunate male was doomed a few days later to lose his second mate which was shot by a member of our party; upon dissection this bird was also found to have a large rattlesnake coiled up in her stomach. We frequently saw redtails sailing about over the meadows with large snakes hanging from their talons.

Buteo elegans lineatus. RED-BELLIED HAWK. Not seen this season south of Ensenada. It seems to be confined chiefly to the creek bottoms where cottonwood and sycamore growths afford it convenient nesting sites.

My notes on this species in Mr. Bryant's list refer to Parabuteo.

Buteo abbreviatus. ZONE-TAILED HAWK. On April 24, 1889, two pairs were found nesting on San Pedro at elevations of 7000 and 7500 feet, and one of the birds secured. The past season only an occasional stray bird was seen, not over four or five, and no nests were observed.

Buteo swainsoni. SWAINSON'S HAWK. One of the most common species in all of the lower valleys, but does not seem to extend very high up on the mountain, as I do not remember seeing it above 3000 feet. One that I shot in the Guadaloupe Valley on April 24 had its inner secondaries and tail feathers so badly burned as to render it unfit for the cabinet. The only explanation seems to be that the bird was hunting near some of the brush fires in the valley and attempted to take a rabbit or other game too near the fire, or perhaps it was attempting to cook its dinner.

Aquila chrysaëtos. GOLDEN EAGLE. No eagles were seen

on San Pedro the past season; they appear to be very rare there. At San Telmo a pair have for years nested in a cliff about ten miles from the coast, where they were seen in April of the present year.

Falco sparverius sub. sp.(?) SPARROW HAWK. One or two sparrow hawks were seen on top of San Pedro, but as no specimens are in the collection I am unable to say which race occurs there.

Strix pratincola. AMERICAN BARN OWL. Very common in the lower valleys, but not observed above the live oak belt at 3500 feet.

Syrnium occidentale. SPOTTED OWL. An owl that I think was this species was flushed from a live oak on the slope of San Pedro at about 4500 feet elevation. Mr. Bryant has recorded a bird that I saw near the same place in 1887.

Megascops asio trichopsis.(?) MEXICAN SCREECH OWL. Screech owls have several times been seen and heard between the coast and the top of San Pedro, but as no specimens were secured the exact position of the sub-species is somewhat doubtful.

Bubo virginianus subarcticus. WESTERN HORNED OWL. Very common in the pine timber of San Pedro and in the coast valleys where there is timber enough to afford it shelter.

Speotyto cunicularia hypogæa. BURROWING OWL. Seen in several of the valleys between Tia Juana and San Telmo. I think none were seen above that point. On June 9 an entire family were seen in the Carriso Valley, perched on the bushes about the burrow.

Glaucidium sp. (?) PIGMY OWL. At Valladares, near the base of the mountain, two were seen by a member of our party, but not secured.

Geococcyx californianus. ROAD-RUNNER. Common in the lower valleys and slopes of the mountain. One was reported to me from 7000 feet.

Ceryle alcyon. BELTED KINGFISHER. One was heard on two or three occasions at La Grulla, on San Pedro. Common on the coast in winter.

Dryobates villosus hyloscopus. CABANIS'S WOODPECKER. Not uncommon in the pines on San Pedro. Given as *harrisii* in my notes in Mr. Bryant's list.

Dryobates scalaris lucasanus. ST. LUCAS WOODPECKER. A specimen taken April 30 at San Telmo and others seen. I have frequently seen *Dryobates* in the cacti along the coast hills from San Fernando north, but owing to their extreme shyness have usually failed to take specimens. It is quite probable that the notes furnished Mr. Bryant regarding the finding of *D. nuttallii* among the cacti of the coast belong to the present species, as I do not think I have ever seen *nuttallii* away from deciduous trees.

Dryobates nuttallii. NUTTALL'S WOODPECKER. Common along all the timbered streams as high as 4000 feet, or the limit of the live oaks and sycamores.

Melanerpes formicivorus bairdi. CALIFORNIA WOODPECKER. Well distributed through the pines on San Pedro, and probably resident; nowhere very plenty, but more common in the oak growth from Ensenada north.

Colaptes cafer. RED-SHAFTED FLICKER. Rather common on San Pedro, descending to the lower valleys in winter.

Phalænoptilus nuttallii californicus. CALIFORNIA POOR-WILL. Poor-wills were very abundant in the lower valleys in late April of the past year, but none were heard above 4500 feet until May 8, when one was heard at our camp at 7000 feet. They were heard at 8500 feet May 25, and one taken at the western edge of the mountain on May 28 was evidently nesting. They were much oftener heard than seen, as they are not much on the wing.

Chordeiles texensis. TEXAS NIGHT-HAWK. Quite common in the lower valleys, especially about the water holes; one seen as high as La Grulla—8200 feet.

Cypseloides niger. BLACK SWIFT. At San Telmo a pair of these swifts appeared about camp several times during the forenoon of April 30th, and one was shot by a member of the party; not noticed again.

Chætura vauxii. VAUX'S SWIFT. At Tia Juana April 16,

I found a small flock of these swifts flying about over a pool of water in company with *Petrochelidon* and *Tachycineta thalassina*. Later they were seen in several localities as far south as Colnett and San Telmo; at this point they were quite common April 30, and evidently migrating in company with swallows. A single bird was seen at La Grulla May 18.

Aëronautes melanoleucus. WHITE-THROATED SWIFT. Seen in several valleys between Tia Juana and the base of San Pedro but all evidently migrating. On top of the mountain they appeared about our camp by dozens and could easily have been taken in large numbers; they were mating and preparing to nest in the high cliffs on the eastern side of the mountain where I found them in 1889. A small colony was found nesting in the cliffs at San Ysidro in May, 1887. On the Coronado Islands, twenty miles from San Diego, a colony was discovered nesting in a cliff overhanging the surf, not over thirty feet above the water, but as usual the nests were inaccessible.

Calypte costae. COSTA'S HUMMINGBIRD. Very abundant in all of the valleys along the coast and base of the mountain; not seen in the pines until about May 20; on May 28 they were building at 7500 feet.

Calypte annae. ANNA'S HUMMINGBIRD. A very common resident of the coast region; not seen until May 15 at La Grulla. As this species, as well as the preceding, nest in March, sometimes as early as February in the lower valleys, it is not at all improbable that the birds that we found in May on the mountain had raised a brood before migrating.

Tyrannus verticalis. ARKANSAS KINGBIRD. One was seen May 15 at La Grulla, the only one seen in the pines; very common in the coast valleys.

Myiarchus cinerascens. ASH-THROATED FLYCATCHER. A few were seen on San Pedro in 1889, and again the past season, but it was not at all abundant; in the lower valleys it is more common. A nest and set of four fresh eggs were taken from a hollow on an elder in the Guadaloupe Valley, June 2.

Sayornis saya. SAY'S PHŒBE. Quite common along the base of the mountain and in all of the coast valleys below 4000

feet. At Valladares they were given to nesting in all of the deserted mines, and I have found their nests twenty feet below the surface of the ground in an old shaft or tunnel.

Sayornis nigrescens. BLACK PHŒBE. Quite common along all of the water courses and resident as high as 3000 feet at least; a single pair were nesting at La Grulla May 22.

Contopus borealis. OLIVE-SIDED FLYCATCHER. Abundant throughout the pine belt, one in my collection from that region has a large, clear, white patch on the throat, lacking entirely the streaking common to that species.

Contopus richardsonii. WESTERN WOOD PEWEE. Very common in San Pedro; one that had its nest in a large pine over our camp on the night of May 28, kept up a calling at intervals of thirty minutes all night.

Empidonax cineritius. ST. LUCAS FLYCATCHER. Very common all over the mountain, especially along the streams and in the willows. It was evidently nesting at the time of my visit in May, but no eggs were taken. From its preference for willow thickets at this time I would expect to find its nests in such places as *E. wrightii* might choose.

Empidonax pusillus. LITTLE FLYCATCHER. Seen only during migrations.

Otocoris alpestris chrysolæma. MEXICAN HORNED LARK. Along the coast as far as Colnett, at least the horned lark belongs to this race as shown by specimens in my collection. At San Quintin, however, fifty miles further south, *pallida* is the race met with during the breeding season if not the entire year. Mr. Townsend's types of *pallida* came from the region just east of San Pedro, which with the San Quintin record on the west led me to expect this form from the mountain meadows. No larks were met with, however, until the eastern edge was reached; here a few were taken that were all true *chrysolæma*.

Otocoris alpestris pallida. SONORAN HORNED LARK. My notes were given to Mr. Bryant and published by him under the name of *rubea*. It seems, however, from the material I have at present that *pallida* is the form found at San Quintin during the

nesting season, giving away to *chrysolæma* a short distance to the north and east.

Aphelocoma californica obscura. BELDING'S JAY. The status of this race is in a condition similar to that of the San Pedro Partridge as already stated. San Diego County birds are indistinguishable from those from San Pedro, but I am unable to secure typical *californica* from Monterey, the type locality. It seems, however, from the series now on hand as if *obscura* would have to be reduced to a synonym of *californica*.

Corvus corax sinuatus. AMERICAN RAVEN. Very common from the coast to the highest point visited on San Pedro.

Picicorvus columbianus. CLARK'S NUTCRACKER. In May, 1889, a single specimen was secured at La Grulla from a flock of *Cyanocephalus.* Later the fragments of another were found where they had been left by a hawk or owl; not met with in 1893.

Cyanocephalus cyanocephalus. PIÑON JAY. Very abundant in the pines on San Pedro. Those taken had their stomachs full of beetles and insects that they had caught in the grassy meadows.

Icterus cucullatus nelsoni. ARIZONA HOODED ORIOLE. Very common along the base of the mountain and in all of the lower valleys, but not seen above the live oaks at 4500 feet.

Scolecophagus carolinus. RUSTY BLACKBIRD. The capture of a single specimen at the base of the mountain has been recorded in Mr. Bryant's list.

Scolecophagus cyanocephalus. BREWER'S BLACKBIRD. Common in all of the lower valleys; at San Vincente a large colony had taken possession of the old olive trees at the abandoned mission and dozens of nests with eggs were seen on April 28. At La Grulla they were nesting in the pines in early May; they were not noticed away from the large meadows, however.

Carpodacus cassini. CASSIN'S PURPLE FINCH. Not uncommon on San Pedro in the pines where it is probably resident; often seen in flocks of the following but very shy and difficult to secure. Not given in Bryant's list.

Carpodacus mexicanus frontalis. HOUSE FINCH. Abundant resident in all of the lower valleys; on San Pedro a few only were found upon our arrival, May 5, but they soon became abundant, especially about the meadows. Specimens from that region are not materially different from Southern California skins in my collection.

Spinus tristis. AMERICAN GOLDFINCH. A few winter about the base of the mountain.

Spinus psaltria. ARKANSAS GOLDFINCH. A common resident about the northern part of the peninsula reaching the lower slope of the mountain.

Spinus lawrencei. LAWRENCE'S GOLDFINCH. Common with the preceding species; not seen above 4000 feet on San Pedro.

Spinus pinus. PINE SISKIN. Well distributed through the pines on San Pedro, but undoubtedly not common; no nests were found.

Ammodramus sandwichensis alaudinus. WESTERN SAVANNA SPARROW. A few winter about the base of San Pedro.

Ammodramus rostratus. LARGE BILLED SPARROW. Very common in fall and winter all along the coast, but never wandering far from salt water. It is considerable of a mystery to me to locate the nesting grounds of this species. Thousands of birds are seen in all of the salt marshes along the coast from the northernmost limit of its range. No decrease is noticed in their numbers until the nesting season approaches, when they suddenly disappear and are not again noticed until August, when they make their appearance with young, and are common about the old haunts until the following spring.

On one occasion Mr. A. M. Ingersoll discovered at San Diego a bird carrying food for its young, but was unable to find the nest owing to the great distance to which the bird flew with its load. On the beach in April, 1887, I shot a female at San Ramon that had undoubtedly left her eggs but a few moments before. As the birds were scarce at that point and I was unacquainted with the rarity of their eggs, I made no effort to find their nests, and, although I have patiently searched for them ever since, I have never again seen birds during the nesting

season. The character of the ground at San Ramon, where a few were undoubtedly nesting, was a broad sand beach, covered with drift-wood, flanked by a few sand dunes, back of which was a series of small lagoons of brackish water, thickly grown to tules. The eggs of this species which are frequently offered to the public by local collectors of Southern California have, so far as my observations have gone, always been taken from the nests of *A. beldingi.*

Zonotrichia leucophrys. WHITE-CROWNED SPARROW.

Zonotrichia leucophrys intermedia. INTERMEDIATE SPARROW.

Zonotrichia leucophrys gambeli. GAMBEL'S SPARROW. All of the white crowns are abundant about the base of San Pedro during the winter months, and a few are to be seen in the pines during migrations. But few specimens were taken and the comparative abundance of the different species was not determined.

Zonotrichia coronata. GOLDEN-CROWNED SPARROW. Quite common during the migrations with the white crowns but seems to winter farther south than the bulk of these species. All of the *coronata* taken in April were moulting and unfit for specimens.

Spizella socialis arizonæ. WESTERN CHIPPING SPARROW. Very abundant about the base of the mountain and resident; one was shot at 7000 feet elevation May 10.

Spizella atrigularis. BLACK-CHINNED SPARROW. Rather common in the hills from the coast to the base of the mountain. I have no specimens from the pine belt, but am sure that its song was heard in May, 1887, at 10,000 feet elevation.

Junco hyemalis thurberi. THURBER'S JUNCO. It is quite probable that all of the Lower California records of *oregonus* belong to the present species. I found them about the base of San Pedro in winter with *townsendi*, and met with them in the Burro Cañon north of Ensenada April 23, the past season.

Junco townsendi. TOWNSEND'S JUNCO. Very abundant throughout the pine region of San Pedro, only reaching the lower elevations in winter. The past season the juncos were found building upon our arrival in the pines, May 5, but no

eggs were found until the 10th. A set of three were taken at La Grulla on the 14th, that were about to hatch. The nest was in an old woodpecker's hole in a large pine that had been blown down, with its top resting on a big boulder. The hole which was about six feet from the ground was on the under side of the trunk and the nest about on a level with the opening; it was composed of dry grasses and lined with deer hair. A nest which was found on May 26 in a hole in a rotten stub about ten feet from the ground contained three eggs slightly incubated. A number of nests, which were found under logs, boulders and similar locations and left for full sets, were all destroyed. Several birds were shot while carrying large bills full of deer hair for nest lining.

Peucæa ruficeps. RUFOUS-CROWNED SPARROW. A series of four skins taken between Tia Juana and the base of San Pedro are practically indistinguishable from Southern California examples; seems to be rather common in a few favored localities along the base of San Pedro.

Melospiza fasciata heermanni. HEERMANN'S SONG SPARROW. Through an error I referred the San Pedro song sparrows to *rivularis* in my notes published by Mr. Bryant. They seem to be true *heermanni*, however. Along the creeks and about water holes this form is more or less abundant from San Diego to the top of San Pedro.

Passerella iliaca megarhyncha. THICK-BILLED SPARROW. A few were seen in October on San Pedro and on one or two subsequent occasions at Valladares.

Pipilo maculatus megalonyx. SPURRED TOWHEE. Not uncommon in the Manzanita and shrub oak growth on San Pedro.

Pipilo fuscus crissalis. CALIFORNIAN TOWHEE. Very abundant along the lower slopes of the mountain, but rather rare in the timbered regions; confined here chiefly to the rocky ridges and Manzanita growth.

Habia melanocephala. BLACK-HEADED GROSBEAK. Quite common during migrations along the base of the mountain; a few

were seen as high as 4000 feet and were probably nesting at that altitude.

Guiraca cærulea eurhyncha. WESTERN BLUE GROSBEAK. Very common in all the coast valleys from San Quintin northward; usually seen in the region of cultivated fields and willow thickets. They were seen in the San Telmo up to within a short distance of the mountain.

Passerina amœna. LAZULI BUNTING. Abundant with the preceding species, with which it was often seen; one or two were seen on top of the mountain.

Piranga ludoviciana. LOUISIANA TANAGER. Quite common; not seen above 7000 feet.

Progne subis hesperia. WESTERN MARTIN. Very common; nesting in colonies from Valladares, 2500 feet altitude, throughout the pines.

Petrochelidon lunifrons. CLIFF SWALLOW. Common in colonies from the coast to the top of the mountain; they were found nesting on the sides of huge granite boulders in meadows of La Grulla May 13, and later on the eastern side.

Chelidon erythrogastra. BARN SWALLOW. A few were noted on top of the mountain; more common along the coast.

Tachycineta thalassina. VIOLET-GREEN SWALLOW. Very abundant from Valladares to the top of the mountain; nesting in hollow pines throughout the region visited. On May 19 a large number of females gathered about camp attracted by the feathers of some mallards that had been shot for the table. Usually the coveted feather was secured without the ceremony of alighting, the bird hovering over the pile until a feather was selected, and then securing it by a dainty dip of the head and immediately dashing off to the nest. A day or so later I shot a junco from a tall pine, which in falling detached a number of feathers. These were almost instantly secured by a flock of these swallows, and before a feather had reached the ground they were all appropriated with the exception of one long white rectrix which was several times caught and as often rejected.

Ampelis cedrorum. CEDAR WAXWING. Rather common about Valladares, where a specimen was secured May 4. I

have never seen any on San Pedro, but several times thought that I heard their call notes.

Phainopepla nitens. PHAINOPEPLA. Very common at certain times about the base of the mountain up to about 6000 feet.

Vireo solitarius cassinii. CASSIN'S VIREO. Not uncommon in the pines where it was first seen May 13; it became more common a week or so later.

Vireo bellii pusillus. LEAST VIREO. Very common all along the base of the mountain, but probably not reaching above the live oaks at 4500 feet.

Helminthophila celata lutescens. LUTESCENT WARBLER. Seen along the western base of the mountain and in all the lower valleys during the spring migration.

Dendroica æstiva. YELLOW WARBLER. Common during migrations in the valleys and as a summer resident in the higher altitudes. A single skin in my collection from La Grulla, No. 4031, May 15, is the brightest colored specimen I have ever seen from any locality, and also differs from others in my series in having a well defined dark shaft streak along the inner web of the tail feathers, occupying half of the web which is yellow to the shaft in all *æstiva* that I have examined. Unfortunately the specimen is the only one I have from that region, and I am unable to say how constant the character may prove to be.

Dendroica auduboni. AUDUBON'S WARBLER. Very abundant during migrations; one taken at La Grulla, May 13.

Dendroica nigrescens. BLACK-THROATED GRAY WARBLER. Rather common as a summer resident in the pine belt, nesting in the Manzanita thickets.

Dendroica townsendi. TOWNSEND'S WARBLER. During the past spring this warbler was first met with in the Burro Cañon, where a dozen or more were seen in the live oaks, April 23. As they were quite restless and somewhat difficult to identify, it is not improbable that *occidentalis* also occurred at this same place. They were again met with at Valladares, May 3, and on the following day on the west side of San Pedro at each of these localities they were quite common in the live oaks with *D. nigrescens* and *occidentalis*.

Dendroica occidentalis. HERMIT WARBLER. Quite common at Valladares and on San Pedro at 4500 feet; several were taken at each camp.

Geothlypis trichas occidentalis. WESTERN YELLOW-THROAT. A female was taken at La Grulla, May 1, 1889; not uncommon about the base of the range.

Icteria virens longicauda. LONG-TAILED CHAT. Common in the lower valleys, but only seen occasionally along the base of the mountain.

Sylvania pusilla pileolata. PILEATED WARBLER. Before we left the pine belt, this warbler had become common along the streams; more abundant, however, in the lower valleys during migrations.

Anthus pensilvanicus. AMERICAN PIPIT. A few seen in May, 1889, on the eastern edge of the mountain; abundant along the coast in winter.

Mimus polyglottos. MOCKINGBIRD. Probably does not extend above 5000 feet on the western slope of the mountain.

Harporhynchus redivivus. CALIFORNIA THRASHER. Not uncommon in the Manzanitas at 7000 feet, but rare above that point; a pair of Harporhynchus was seen in the shrub oaks at about 10,000 feet altitude that I thought was *crissalis*, but as they were not taken, the record is open to question.

Campylorhynchus affinis. ST. LUCAS CACTUS WREN. Common as far up the San Telmo Valley as suitable nesting ground was seen, about thirty miles from the coast. Mr. Bryant recorded it from as far north as San Quintin, fifty miles south of San Telmo.

Salpinctes obsoletus. ROCK WREN. One found nesting at 8500 feet; more common on the lower slopes.

Catherpes mexicanus punciulatus. DOTTED CAÑON WREN. Not uncommon in several places on San Pedro.

Thryothorus bewickii spilurus. VIGORS'S WREN. Common along the western slopes of the mountain.

Troglodytes aedon aztecus. WESTERN HOUSE WREN. Abundant in the pines.

Sitta carolinensis aculeata SLENDER-BILLED NUTHATCH. Rather rare but well distributed in the pines.

Sitta pygmæa leuconucha. WHITE-NAPED NUTHATCH. The most abundant species on the mountain; found everywhere in the pines. Upon our arrival May 5 this species was mating; noisy little companies of five or six to a dozen were seen chasing one another through the pines, chattering and calling from daylight till dark; although dozens of nests were discovered all were practically inaccessible. A favorite location for the burrow was on the under side of a dead branch, well away from the trunk of a large pine, and from twenty-five to a hundred feet from the ground. A series of over one hundred and thirty skins sustain the characteristics of the types to a very gratifying degree.

Parus inornatus griseus. GRAY TITMOUSE. Seen in several localities on San Pedro but not at all common. Specimens from the base of the range were identified as *griseus*, but as I have no specimens from the pine belt I can only surmise its identity.

Parus gambeli. MOUNTAIN CHICKADEE. Abundant in the pines but found chiefly in the region of Manzanita and oak thickets. In winter it was seen about Valladares and along the lower valleys.

Chamæa fasciata henshawi. PALLID WREN-TIT. Common along the lower slopes of the mountain and not rare in the highest altitudes where it nests in the shrub oak and Manzanita.

Psaltriparus minimus californicus. CAIFORNIA BUSH-TIT. Not common in the pines, but noted from several localities; very abundant below 3000 feet.

Regulus calendula. RUBY-CROWNED KINGLET. Rather common during migrations.

Turdus ustulatus. RUSSET-BACKED THRUSH. Seen in the pines as late as May 25; a female taken May 21; it is possibly a resident of the pines, but those taken showed little enlargement of the ovaries, and it is more probable that they were belated migrants.

Merula migratoria propinqua. WESTERN ROBIN. Common along the base of the mountain in winter; a few were seen in May, 1889, at La Grulla, but none were noted the past season.

Sialia mexicana. WESTERN BLUEBIRD. Very common during migrations from sea level to the top of the range, a few lingering to nest with the local race. A series of seventy-five skins taken the present year during the nesting season sustain the characters of *anabelæ*, as set forth by myself in 1889, to a strong degree, only about 5% of the males showing an unbroken band of bay on the breast, which refers them to true *mexicana*, and many of the high-plumaged males of the *anabelæ* stripe were almost entirely without bay markings on either breast or scapulæ.

LEUCARCTIA RICKSECKERI.

DR. H. H. BEHR.

Mr. L. E. Ricksecker sent me four specimens of a Leucarctia which he raised from larvæ found on a species of Senecio, and after careful comparison as to description and figure of *L. albida*, Stretch, I think that Mr. Ricksecker is justified to consider them a new species.

As Mr. Ricksecker lives in the country, rather isolated from scientific intercourse, he has empowered me to publish and name the species. I call it after its discoverer.

L. RICKSECKERI: ♂ grisea, ♀ alba. In utroque sexu palpi annulis duobus et apice atro signati. Antennæ atræ supra serie punctorum minimorum candidorum signatæ. Abdomen luteum, crines basales segmentumque apicale albi, series punctalis dorsalis atra. Alæ ♂ ris anticæ griseæ fasciis dilutis obscuris, posticæ sordide luteæ puncto discali et duobus submaginalibus dilutis. In utriusque sexus alis anticis ad bifurcationem venæ medianæ puncto atro bene distincto notatæ.

*L. Ricksecker*i is about the size of small specimens of *L. Acræa*. ♀ wings immaculate, except a minute black discal spot on anterior wing. Body similar to *L. Acræa*, but with the black spots fainter, sometimes obsolete. ♂ thorax and anterior wings a diffused smoky color, immaculate except the minute discal spot. Posterior wings yellowish-brown with one discal and two or three submarginal spots quite indistinct and nearly obsolete. Both pairs of wings are brown underneath with a few variable obsolete black points.

I have very little to add to this description of the insect by Mr. Ricksecker. It is true the description of *L. albida* by Stretch could be construed into a description of *L. Rickseckeri* ♀. Mr. Stretch states that the specimen (a unicum) from which he described was in very bad condition, so that the discal point may have been wiped off in both anterior wings, and even the sex may have been mistaken, as the circumstance of the specimen being a unicum prevented dissection. No entomologist likes to destroy a unicum. But the characteristic of the palpi distinguishes the species at once and leaves no doubt as to its specific distinction. Coloration and markings of the ♂ distinguish the species from all American Leucarctias, and approach it to an East Indian species in our collection, which I received in several specimens from the coast of Arracan. This otherwise very distinct species has the same coloration as the ♀.

In regard to its biology, I give here again the words of Mr. L. E. Ricksecker: "June 11, 1891, I found three larvæ about full-grown, similar in general appearance to those of *L. Alaea* on a species of Senecio. They commenced spinning cocoons June 18, and three males emerged July 18, 1891. June 18, 1893, I visited the same place, and after a long day's diligent search I had twelve caterpillars. June 15, they commenced spinning cocoons; June 20, eight cocoons (the remainder escaped from cage); July 5–12, six imagines— ♂ 2, ♀ 4. Two cocoons contained parasites. Locality, Sonoma County." These are the notes of Mr. Ricksecker's journal.

CALIFORNIA EARTH-WORMS OF THE FAMILY OF EUDRILIDÆ.

BY GUSTAV EISEN.

California, although a dry and rainless country for six months in the year, still possesses a varied oligochætological fauna rich both in species and individuals. The earth-worms—angle and rain-worms—burrow deep in the soil during the dry and warm months and lie there encysted and closely rolled up in clay chambers and waiting for the rain to set in in the autumn.

With these first rains in October the worms leave their self-made clay chambers and ascend to the upper strata where they live and propagate during the winter months, until April and May, when the same process of summer-rest is gone through again. In the large and dry valleys earth-worms are always scarce, owing, of course, to the greater dryness of the plains in summer time. In the driest places the worms are entirely wanting, except, possibly, in some bogs and swamps, where an indigenous species of Allolobophora is always common.

The higher earth-worms (the water-worms excepted) in California can be referred principally to two large families, Lumbricidæ and Eudrilidæ, there being besides one single species of Acanthodrilidæ. It must, however, be stated that the Pacific Coast has not been thoroughly explored, and many more species, genera and families, are likely to be discovered. A species of Perichæta is found in a nursery hothouse in San Francisco, undoubtedly introduced from the tropics. In the Baja California cape region other tropical forms appear, and the common earth-worm there is a species of Urochæta, as well as one or more of Allolobophora.

So far no true earth-worms have been described or even enumerated from California with the exception of two species described by Kinberg. About thirty years ago he visited California and described *Lumbricus apii* from Sausalito near San Francisco and *Pheretima Californica* from the same place. But the descriptions of these species are so insufficient that the worms cannot even be identified as to family, much less to genera and species. They must of course be ignored.

"Pheretima," he says, "has from forty to fifty-six setæ on every segment, and was found both in the hills of San Francisco and in soil at Sausalito." But though I have repeatedly searched in those localities I never succeeded in finding any worms thus characterized, and I am inclined to think that Kinberg's labels became mixed, and that Pheretima at least was never found in this State. Of the family Lumbricidæ California possesses probably a dozen species, some of which are common the world over. There are, however, a number of indigenous species, the description of which will be reserved for a future article. The most common of the Lumbricidæ is a large species of Allolobo-

phora, dark brown in color and which inhabits wet places. There is no Lumbricus. By far the most numerous worms belong to the family of Eudrilidæ. They are easily distinguished by their pinkish color, coupled with the fact that the male papillæ open in the posterior part of the clitellum. There are of this family two distinct genera with at least four or five species, some of which are large, others very small, resembling in size Ocnerodrilidæ, which latter genus is represented by at least one species, which however may be of southern importation, as its distribution is exceedingly limited. In Baja California two genera of this family are represented by at least two species, and in Mexico and Central America by many. It possesses a large southern distribution.

I have so far distinguished the following genera and species in California, of which a more detailed account is soon to be published in the publications of the California Academy of Sciences of San Francisco.

DELTANIA GEN. NOV.

Prostomium dovetails somite i. Eight setæ in four couples, beginning on somite ii. Setæ of the inner couples in the genital region converging towards the male pore. Buccal cavity, pharynx, œsophagus and sacculated intestine, but no gizzard and typhlosole, nor œsophageal pouches. Clitellum xiii to xvii. No dorsal pores. Testes in x and xi. Spermsacs present and free. Spermatheca present or absent. Ovary one pair in xiii, oviduct in xiv. No ovisac. Spermducts open in xvii together with a large paired prostate. The spermducts join the muscular part of the prostate in the body wall. Penial setæ open in the same duct as the prostate. No subneural vessel. The anterior few nephridia open in front of seta 4, the posterior nephridia in front of seta 3. All nephridia furnished with a large terminal bladder near the body wall.

Small, transparent, glossy worms with orange-colored clitellum, living in moist, especially sandy soil. The genus differs from Microscolex principally by the deltoid arrangement of the ventral setæ in the vicinity of the male pore.

The genus appears indigenous to the American Continent, species having, however, been found in Australia and Madeira,

though it is probable that the Australian species has been introduced from some other country.

There are at least three California species.

DELTANIA ELEGANS n. sp. Size two to four inches. Septal glands very small, the posterior one being the smallest. Spermatheca variable, very pellucid, assuming the nature of a spermsac. Spermsacs small, deeply lobed, one pair in xi and one in xii. Prostate helix-like at the top. Penial papillæ with two or more penial setæ in each sac.

Habitat.—San Francisco, Berkeley, Mount Diablo, Santa Rosa, or in general, the country surrounding San Francisco Bay. Is probably of a much wider distribution.* This is the largest species of the genus so far known.

The most important feature of this species is the abnormal construction of the spermatheca. Instead of being a highly muscular and glandular organ with a muscular duct, it simply consists of a very thin-walled sac or membrane in which spermatozoa are stored. But the most peculiar fact connected with the spermatheca is, that it is variable in position, sometimes being median, sometimes paired, or sometimes entirely absent, thus demonstrating the great variability of the organ. This species differs from *Deltania dubia* Fletcher by having the anterior nephridium commencing already in somite ii, the latter species having the first nephridium in v.

DELTANIA TROYERI n. sp. A very minute species of the size of an Enchytræus, largest specimen about one and one-fourth inches by one-half line, while most specimens are smaller. Septal glands large, the one in vi the largest. One pair of large, opaque and permanent spermatheca with one pair of diverticula in ix opening viii ix. One developed seta in each sac of penial setæ. Prostate tubular, not helix-like at the top. Penial exterior papillæ not prominent. The inner couples of setæ are further apart than in the following species. The diverticula of the spermatheca are about one-half or more longer than the spermatheca.

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* Since writing the above I have found two species of Deltania in Baja California at Ensenada; the genus has thus a wide distribution.

Habitat.—Golden Gate Park, San Francisco, together with the former species. First found by Mr. Carlos Troyer, to whose interest and kindness I owe the possession of several new species of Oligochæta.

DELTANIA BENHAMI n. sp. Size about one inch by one-sixteenth. The inner couples of setæ as well as the setæ in the inner couples are much closer together than in any of the other species. The spermatheca large, opaque, in ix, opening viii, ix, with two diverticula, which are less than one-half as large as the central spermathecal sac.

A small, very hyaline worm, entirely distinct from the preceding species and at once characterized by the closeness of the ventral setæ, and by the size of the spermathecal diverticula. Much more pellucid than the preceding species. Blood yellow.

Habitat.—In the small cañon coming from Lake Chabot, Alameda County, Cal., under moss or in the top soil at the foot of trees near the creek.

ARGILOPHILUS GEN. NOV.

A genus related to Plutellus Perrier, but characterized as follows: Prostomium encroaches on the peristomium. Eight setæ in four couples, commencing in ii. The setæ of the inner couples not converging toward the male-pore, but closer set than the setæ of the outer couples. Buccal cavity, pharynx, œsophagus, gizzard, tubular-intestine, sacculated intestine, typhlosole, but no œsophageal glands or pouches. Clitellum not developed ventrally. Spermathecal pores between vii/viii and viii/ix. One or two longitudinal *rows* of ventral papillæ. Two pair of spermathecæ. Testes in x, xi. Spermsacs paired in x, xi, xii, some of which enclose the ciliated funnels. Two pair of spermducts, which join their respective very large coiled prostates in xviii, at the upper end of the muscular duct. Two penial setæ open in the same pore, but not in the same duct as the prostate. Nephridia without any vesicle at the body wall. Nephridia pores open variably, some in front of the third, some in front of the fourth, and others outside of, or lateral of the fourth setæ, without any serial regularity. Blood red.

Large earth-worms with thick round bodies and pale flesh—

color, marbled bluish. As far as known, California possesses two outwardly distinct forms, but which on account of their exact similarity as regards their internal anatomy, I must refer as subspecies to the same general species.

ARGILOPHILUS MARMORATUS ORNATUS n. sp. The ventral side of the genital somites furnished with two longitudinal rows of ventral sensory papillæ, one row on each side of the median line. The number of papillæ, which are strictly intersegmental, varies from one to seven or more.

Habitat.—North of San Francisco Bay as far up as Oregon. Very common in the vicinity of Santa Rosa, etc., especially in heavy moist, and rich clayey soil. The most common earthworm of the region. This species was first found by Miss A. Eastwood of California Academy of Sciences.

ARGILOPHILUS MARMORATUS PAPILLIFER n. sp. The ventral region of the genital somites and posterior to the clitellum furnished with a single row of median intersegmental papillæ, varying in number up to seven or eight or more. The papillæ are generally longer than in the preceding species. Although I have examined hundreds of specimens I have never seen any transitions between these forms. If the papillæ in these subspecies were of constant number I would not have hesitated to pronounce them as equal in importance as species characteristics to the tubercula pubertatis in the true Lumbricidæ. The great variability in the number of the papillæ, however, place them in a somewhat different light, the only constancy of outward character being that in one form they are paired, in the other median. In the paired form they are situated one on each side of the ventral ganglion, while the median ones are situated directly under the ventral ganglion, one or one pair in each segment.

Habitat.—This form is, so far, found only south of the region inhabited by the former. I have specimens from Berkeley, San Joaquin Valley, Monterey, San Francisco, Palo Alto, etc., but only one single specimen from Santa Rosa, where the former form is most abundant. The species prefers very heavy adobe soil, and occurs only in the richest ground, never in poor soil. The occurrence of Argilophilus is always a sign of the fertility of

the soil. A single specimen of what appears to be a new species of this genus was brought by Mr. Louis King from Portland, Or., but being very badly preserved I must leave its description for some future time.

CONTRIBUTIONS TO WESTERN BOTANY. No. 5.

BY MARCUS E. JONES.

REVISION OF THE AMERICAN SPECIES OF AQUILEGIA NORTH OF MEXICO.

In studying the species of this genus a person is struck with the amount of labor wasted in describing them, and the uncertainty attaching to the species recognized. This is due largely to the multitude of characters belonging to the genus that are not given in any book and which most people do not know are generic. The really specific characters are few. There are two distinct lines of species in the genus so far as our western ones are concerned, which hybridize among themselves and possibly with each other. One line has petal-limb dilated above and flowers never truly red; the other has petal-limb not dilated above and red or reddish flowers. The following gives my views of this genus, though I am inclined to think that further research may prove that *A. flavescens* will become a variety of *cærulea*, *A. formosa* a variety of *A. Canadensis*, while the margin between *cærulea* and *chrysantha* is very slight.

AQUILEGIA L. COLUMBINE.

Parts of flowers in fives (except stamens) petal-like, alternate, stamens many. *Sepals* narrowed at base into a short claw and bent at base, usually acute, equaling the limb of petal or longer, widely spreading or reflexed, rather veiny, often green-tipped and simulating a gland. *Petals* either saccate at insertion or prolonged backward into hollow, usually tapering spurs which are short to four inches long and with a nectary in the tip set obliquely on the spur; limb of petals either almost obsolete or nearly equaling the sepals, usually rather thick, erect, and yellow, or sometimes white at least at the tip. *Stamens*

separate, many, an inch or less long, erect except in the first stages; anthers yellow, elliptical to oval, and usually obtuse at both ends, basifixed, one-half a line or less long, wider after bursting, filaments yellow and filiform at apex, white and enlarged and scale-like at base; next the ovaries is a sheath of sterile filaments which are enlarged throughout, nearly equaling the others, lanceolate, ridged, corrugated and white. *Ovaries* five, erect, closely aggregated, linear-cylindric, densely white-pubescent with glandular hairs up to the glabrous, filiform, persistent styles (two to four lines long) which with the ovaries are a trifle shorter than the stamens in flower, but the rapid development of the ovaries soon thrusts out the styles; stigma very small and capitate. At maturity the carpels lengthen to about an inch (half an inch in one case) and are linear, straight, but bent outwards at tip, cross section obovate, opening along the inner side from the oblique tip down, sparsely glandular-hairy, reticulated; seeds many, in a single row, horizontal, obliquely obovate cylindric, a line long, rounded on the back, with sharp inner edge, very black, smooth and shining when fully ripe, but less mature ones are brown. *Flowers* paniculate, racemose, or in one species single, the main stem sending off, usually above the middle, three to five branches remotely, each branch being subtended by a single leaf, branches a foot or less long, and lower half naked while the upper half has one to three flowers or rarely is again branched with one to three flowers on each branch, flowers terminal and centrifugal (central one blooming first). *Peduncles* usually with leafy bracts at base, and central one often with two in the middle, peduncles one to four inches long, more or less bent, but erect in fruit, longer than the flowers, glandular hairy. *Roots* perennial, fusiform, thick, with many short stout spreading branches at the top which are covered and much thickened with closely imbricated and old leaf sheaths. *Stems* tufted, erect, bent at base, tall (except in two species), usually leafless below, especially the lower third. *Leaves* with short, ridged sheaths one-fourth to an inch long; root leaves biternate (triternate in one species and with petiole absent in another), many, petioles long, generally about one-third the length of the stems; primary divisions of petiole two to four

inches long, secondary ones an inch long, or even all but the central one absent; leaflets irregularly two to three-lobed and the lobes entire to three to five lobed or toothed, and teeth rounded and blunt, leaflets obovate, cuneate, or broader, one-half to two inches long, seldom pubescent, glaucous or paler below; lower stem leaves similar with shorter petiole; upper stem leaves without a petiole; uppermost leaves reduced to simple or three to five-lobed usually leafy bracts which are usually acute; the development of the stem leaves depends upon the exposure inversely. The whole plant except the leaflets is covered with a glandular hairy pubescence which is scarcely visible at times and at others is very pronounced, but is of no specific value. It is most pronounced on the peduncles and young pods, and is more evident above. The genus frequents open woods in the East, and stream banks and moist mountain sides at rather high elevations in the West.

* *Limb of petal somewhat dilated above, oblong to rhomboidal, large, at least half as long as the sepals, and about equaling the stamens, flowers not red. Petals rounded, truncate or emarginate.* § *Dilatæ.*

\+ *Stems tall, often three feet high, nearly glabrous below; sepals acute, spreading, rather thin, nectary small.*

\+\- *Spurs long, straight, slender, two to four inches long, not shorter than sepals, nectary very small, apparently abortive; flowers large, one and one half to four inches wide, ascending; limb of petal four to six lines wide, six to ten long or even more.*

A. cærulea, James. Sepals white or lavender, lanceolate to broadly ovate, one to two inches long, occasionally tinged with pink or yellow; flowers two to four inches wide, petal-limb six to eight lines long, white to deep cream yellow, sepals and petals both frequently veined with blue, fragrant.

Abundant in Colorado at middle elevations 7000 to 11,000 feet altitude in all the mountains, mostly on moist mountain sides; very abundant in the Wasatch and Uintas at 8000 to 10,000 feet altitude and therefore subalpine, also in the Pine Valley Mountains in southern Utah; less abundant south and

west in the other ranges, also Mt. Ibapah in the Deep Creek Mountains, Jeff Davis Peak and the Schell Creek Mountains in eastern Nevada at high elevations, and probably in the East Humboldt Mountains; rare in Nevada and the Sierras of California, also northward to the Arctic regions. Much esteemed in cultivation where it is bluer.

A. chrysantha, Gray. *A. leptocera* var. *flava* Gray Pl. Wright 2, 9. *A. chrysantha*, Gray Proc. A. A. S., 8, 621. Flowers golden yellow throughout, one to two inches wide, spurs much longer than the sepals and very slender; sepals lanceolate, less than an inch long; petals as above.

Lower elevations 6000 to 8000 feet altitude in Colorado, and higher altitudes southward to 10,500 feet in Arizona. Rocky Mountains of Colorado from Colorado Springs south through New Mexico and Arizona. Not yet known in Utah. This appears to hybridize with *cærulea*, the flowers being yellow or tinged with blue and spurs shorter. Should it become necessary to recognize the varietal name, this will become *A. flava* (Gray).

A. longissima, Gray. Flowers yellow, spurs filiform, four inches long, and of about the same width throughout, petals nearly equaling the lanceolate sepals, elongated-spatulate. May be a form of the above.

Northern Mexico, *Palmer*.

++++ *Spurs short and thick, six lines long or less, somewhat hooked at the end, not longer than the small sepals, nectary large, flowers small, not even an inch wide and often very small, nodding or ascending, yellow, but often tinged with red or blue.*

A. flavescens, Watson King's Rep. 5, 10. Sepals lanceolate to oval, six to eight lines long; petal-limb somewhat dilated, about equaling the spur and nearly as long as the stamens, four lines wide, anthers elliptical-oblong, when the flowers are very small all the parts are small in proportion, except the stamens, which remain the same. All but the leaves often pubescent.

Six thousand to nine thousand feet altitude along streams in very wet, exposed, and boggy places, rarely at high elevations, most abundant at low elevations, cañons of the Wasatch from

central Utah northward to British America. It also occurs in the Uinta Mountains, but does not seem to exist in Nevada or westward. June to August. At high elevations it hybridizes with *A. cærulea*, the flowers being intermediate in size with shorter and stouter spurs than *cærulea*, whitish or tinged with blue.

\+ \+ *Stems very short or none; flowers blue, small, one-half inch wide or less, spurs somewhat hooked, two lines or less long, shorter than the limb of the petal.*

A. brevistyla, Hooker. Flora Bor. Am. 1, 24. Stems six inches high or less, densely tufted, not surpassing the leaves, stem leaves petioled and scarcely differing from the others, pedicels two to three inches long, very slender; sepals oval and very obtuse and green to lanceolate, acute, and colored, four lines long, three lines wide; limb of petal oblong, yellow, a little shorter than the sepals and a little longer than the stamens; carpels about an inch long, and styles in fruit two lines long, anthers narrowly oval and very small.

High Alpine regions in meadows, Colorado and northward to the Arctic regions. Not seen in Utah or westward.

A. Jonesii, Parry Am. Nat. 8, 211. Named for Captain Jones. Monocephalous, peduncle two to three inches long; leaves all crowded and common petiole absent or nearly so; leaflets small, obovate, entire, nine; spur almost obsolete. Probably a form of the above.

Summit of Phlox Mountain, Wyoming.

* * *Limb of petal not dilated above, usually with a very short, triangular tip or narrower, styles four lines long, flowers red, rarely yellow, at least the tip of the limb of the petal yellow or white, acute to nearly truncate, sepals acute, stamens usually much surpassing the petals, spurs rather stout, generally somewhat hooked, nectary large, flowers nodding, one to one and one-half inches wide, tall plants.* § *Rubescentes.*

A. Canadensis L. Spurs one-half to twice longer than sepals, three-fourths to one inch long; sepals ovate one-half inch long; petal limb oblong to nearly square, four lines long, two to three

lines wide, nearly truncate; anthers elliptical, one-half line long. Upper leaves scarcely bract-like.

Open woods in the Eastern States. Seems to occur from Arizona to British America, in the Rocky Mountains rarely, at 8000 feet altitude or higher, but all these forms may be the next if it is distinct which is doubtful. Also in the San Francisco Mountains, Arizona Jones. May hybridize with *cærulea*.

A. formosa. Fischer, DC. Prod., 1, 50. Stout spurs about equaling the ovate sepals, five lines long, reflexed or widely spreading; petal limb three lines long, as long as broad, narrower at apex; stamens an inch long; anthers narrowly oval. Probably a form of the above, though the spurs are shorter and the upper leaves are more bract-like.

Along streams near the bases of the mountains, in cañons, 6000 to 8000 feet altitude. Said to exist in Colorado, frequent in western Utah, Nevada, and northward to British America, also Oregon, not found in California.

A. formosa, var. *truncata* (Fischer & Meyer), *A. truncata*, F. & M. Ind. Sem. Petr. Supp. 8. Differing from the above only in the limb of the petal being reduced to a rudiment. Intermediate forms seem to occur.

Along mountain streams at middle elevations in California and northward. May hybridize with *A. cærulea*.

* * * *Spurless; leaves triternate, flowers white or pink. Peduncles very long.* § *Pseudaquilegia.*

Aquilegia ecalcarata, Eastwood, Zoe ii, 220, two feet high, very slender, stems inclined to be glaucous and whole plant minutely and sparsely glandular pubescent; leaflets distant and few, on capillary stalks, sharply cuneate at base, thin, an inch long, veiny; peduncles four to six inches long, very slender, erect; bracts lanceolate-ovate, three lines long, entire; flowers three-quarters of an inch wide, parts delicate, thin; sepals closely and parallel veined, lanceolate, acute, spreading; petals the same as sepals but more delicate, and barely saccate at base; stamens just equaling the petals; anther very small, narrowly oval; styles barely pubescent at base, longer than usual; ovaries minutely glandular pubescent when young, when mature almost

glabrous; pods one-half inch long, delicate. The peduncles are almost glabrous, and the stem leaves have the petiole reduced in my specimen to a sheath.

Damp alkaline soil under shaded cliffs in S. W. Colorado June to July. Found first by Mr. Alfred Wetherill then by Miss Eastwood.

NOTES ON TOWNSENDIA.

This genus has always been a trying one to me because the descriptions have not fitted the plants as they grow. It now becomes evident that the trouble has arisen from the undue emphasis which Dr. Gray gave to the pappus, this being of almost no value. The glochidiate hairs seem to hold but there is one species in which there seems to be a transition in that respect. Although several species are said to be annual I have never yet seen a specimen that I would swear was an annual; most of these seem to germinate in the fall and put out a few leaves, while those said to be winter annuals are doubtless biennials; most of those said to be biennials are at least three years old, while few of them endure over four years, except perhaps *T. Fendleri*. All are early bloomers, for the altitude in which they grow, except *T. Fendleri* and even that may begin to bloom early but continues till frost.

Taking the order of Gray, *T. eximia* and *T. grandiflora*, Nutt. have glabrous rays. An interesting form from Labron, Colo., August 30, 1873, by Greene, has heads smaller than those of *T. eximia* and is diffusely and intricately branched, rigid, only minutely pubescent, with the scales and habit of *T. eximia* and the pappus of *T. grandiflora*. This is in the Herbarium of the California Academy. It may be a hybrid.

T. Parryi, Eaton. There are some points omitted from the description of the type by Gray. The leaves are acute, one-half to one and one-half inches long of which the blade is one-half and the petiole is slender; heads ebracteate; peduncle thickened above; scales ovate to lanceolate, soft and thin, scarious except midrib, acute, closely imbricated with no evident ranks but the outer successively shorter, not acuminate; heads six lines high; rays one inch long. This has widely lacerate scales, and is evidently a short lived perennial. From the type in the Herbarium

of the California Academy. This simulates *T. grandiflora* very closely but a specimen collected by Tweedy in May at a place in Gallatin County, Montana, tends to connect it with *T. florifer*. The heads are larger, and stems two to three inches high, spreading, lax; leaves spatulate, obtuse, and like those of *T. scapigera*. It is separable from *T. florifer* only by the perennial root, and the scales. The pappus of disk and ray are equal, and the ray is glabrous.

Townsendia florifer, *scapigera*, and *Watsoni* are manifestly much confused. The first was originally described as a perennial and is certainly a biennial at least, the second was described as perennial and is manifestly such but blooms the second year, the third is not a good species unless it covers many things referred to the first and the second by Gray, while its real character, a winter annual seems to have been overlooked by Gray or confused with the others.

Townsendia florifer (Hook.) Gray, as I understand it, is confined to Oregon, Washington and northwestern Nevada. It is a little ashy, but the leaves are usually nearly glabrous, and thick as though succulent; involucral scales about one-half as many as in *T. Parryi*, and definitely separable from that species only by the scales, which are green and ashy and much less imbricated; stems spreading, two to four inches long; leaves spatulate to linear-spatulate, shortly apiculate, the blade as long as petiole; heads one-half inch high and three-fourths inch wide; pappus equal in all the specimens I have seen. This is drawn from specimens in the California Academy from Washington, *Brandegee, Howell;* Virginia City, Nevada, *Brandegee.* Another form from Walla Walla by Mr. Brandegee has linear-spatulate leaves, acute, one to two inches long, and solitary heads on stout, leafy peduncles, which are ascending, and four to five inches long, rarely branched in the middle; whole plant ashy strigose to the scales; heads one-half inch high and very many. All the above forms are biennials. The rays are rough with yellow sessile glands on the outside. The plants seem to be confined to the valleys at low elevations, but may ascend the lower slopes of the mountains.

Townsendia scapigera, Eaton, so far as I know it, is rare. If all the plants which have been referred to it belong with it, the range is at least from southern Utah and northward to Idaho and westward to California, in the mountains at low elevations; *i. e.*, not alpine. Taking the type as given by Eaton in Bot. 40th, Parallel 5, 145, Fig. 17, my material from McIntyre's ranch, Utah, May 18, 1891, at 7000 feet altitude, corresponds with Eaton's type exactly, except that the plant is densely matted (surely perennial); leaves very narrowly linear, a little widened at apex, heads many and sessile, one-half inch high, three-quarter inch wide. Other characters not given by Eaton are that the rays are a line wide; lead-purple in the centre and with white margins, half an inch long, pubescent with white, rarely yellow, atomiferous gland-like bodies on the outside, rather firm in texture; leaves strigose and rough, thickish.

My material from Deep Creek, Utah, June 6, 1891, altitude 5500 feet, is the same as the above, except that the rays are only three lines long, and the leaves are spatulate and hoary strigose; plant two years old. My material from Schellbourne, Nevada, July 13, 1891, at 8000 feet altitude, is certainly three years old, and the same as Eaton's type, but closely branched; inner scales linear oblong, mostly acute, hyaline margin narrow; peduncles barely surpassing the leaves; very minutely pubescent; rays pubescent as in the above. My material from Wells, Nevada, is certainly perennial in small mats, whole plant white and rough with stiff hairs; peduncles with several bracts; scales linear, simply acute, sparsely strigose, lacerate margins rather wide; otherwise as in the type. The first form given under this species would be at once taken for *T. sericea*, but it is not that plant.

Other forms that may eventually prove to be *T. scapigera* I have given the provisional name of *T. montana*. To all appearances they make at least one good species. The type is a specimen from Alta, Utah, collected above the Flagstaff mine at about 9500 feet altitude, and therefore subalpine or alpine growing on rocky mountain sides. Loosely matted from a root at least three years old; leaves one and one-half inches long, blade oblanceolate and half the whole, nearly glabrous, but petioles rough with short hairs and under the microscope the blades are sparsely

pubescent, leaves fascicled at the top of the short branches of the root; heads one-half inch high, almost sessile and surpassed by the leaves, peduncles not lengthening with age; scales narrowly oblong, the outer the narrower, rounded at apex, the hyaline and lacerate margin narrow, midrib green; scales in about five ranks and the outer very short, inner scales one and one-half lines wide and shorter than the pappus; rays three lines longer than the disk, purple, three-quarter line wide; pappus alike and akenes glabrous; rays glabrous or nearly so. Another specimen which I refer to this I collected above Silver Lake in American Fork Cañon, Utah, July 30, 1880, at about 10,000 feet altitude, which is the same as the above, except that it is at least four years old and more loosely branched and leaves only an inch long. The inner scales are acute with rather wide lacerate margins, outer scales short, scales in at least three series; heads sessile. The glabrous akenes and habitat would indicate a distinct species.

Townsendia Watsoni, Gray. If Dr. Gray has not confounded this with the true *T. florifer* then this is not a good species. In order to find out I had two plants which I knew grew from the same seed sent to Harvard, one of them came back labeled "*T. florifer*" and the other "*T. Watsoni.*" It is therefore evident that the varying pappus was considered a specific character by Dr. Gray and was used to separate the species, but it is of no value whatever in this group and is hardly of any value in the genus at large. From quite an amount of material from the northwest it seems likely that there may be some good characters left on which to separate the species, the chief one being that the true *T. florifer* is biennial or more, while our plant of Utah and most of Nevada is a winter annual, almost white with a rough strigose pubescence which is short or long, the scales are in about two ranks; rays very pubescent on the outside with flattened hairs with yellow gland-like tips. Our plants are never fleshy and the leaves are not thick. It is a more graceful plant, and grows in the valleys in very dry places and is an early bloomer, it soon dries up and blows away. It is the plant referred to by me in "Contributions No. 3" as being a diurnal with flowers opening between nine and ten o'clock A. M., and closing between five and six o'clock P. M. It is the only *Townsendia* of our

valleys and abounds in western Utah and eastern Nevada at elevations from 4300 to 5500 feet. If these distinctions given to uphold the species fail, then this species cannot be maintained.

Townsendia sericea Hooker. A form of this in the Herbarium of the California Academy collected by Greene in New Mexico, locality not given, has the scales of *T. Rothrockii* and the pappus and leaves of *T. Wilcoxiana*, tending to confirm a suspicion which I have long entertained that these two species are only sports of *T. sericea*, and are not valid. A form collected by Miss Eastwood at Mancos, southwestern Colorado, June, 1891, shows an approach to *T. incana*. The rays of *T. sericea* are glabrous.

Townsendia incana, Nutt. As I have already indicated *T. Arizonica* is a form of this species, being separable only by the pappus a worthless character. In looking over my material from Milford, Utah, 1880, and named by Gray himself, I find that the pappus of the ray is often one-half that of the disk and the heads are often short peduncled with all sorts of transitions between, the rays are glabrous except very minute atoms scattered over them. True *T. incana* usually grows in smaller mats in lower elevations and has the rays pubescent with flattened hairs which are tipped with yellow gland-like enlargements. It is very common in the Sonoran region of eastern Utah and southwestern Colorado, and blooms in May and June. An interesting form of this species is—

Townsendia incana Nutt. var. *ambigua*, n. var. This would suggest *T. grandiflora* in some things. Short-lived perennial but blooming the second year; leaves spatulate, acute, gradually narrowed into a long petiole one to one and one-half inches long; heads ebracteate, from sessile to peduncled, peduncle being sometimes three inches long, one-half inch high or more, one-half inch to an inch wide; bracts in two to three series, acute. In all the specimens which I have seen, the pappus is in the ray flowers less than one-third that of the disk flowers, of single scales that are very narrow and bristle-like; otherwise exactly as in the species, except that it is less branched than the type. Common with the type in the same region as the type. It blooms from the middle of April to June. Collected

by myself in several localities in 1891 and in the same region by Miss Eastwood in 1892.

Townsendia glabella, Gray. This plant seems to have been collected but very little. Miss Eastwood sends it from Mancos, Colorado, collected in June, 1892. Her plants are perennials in a dense cæspitose tuft; bases of leaves villous otherwise glabrous, leaves spatulate to oblanceolate, acute, blade one-half to three-quarters inch long, two to three lines wide equaling the petiole; heads four to five lines high, on a naked peduncle one-half to one and one-half inches long; scales in two series the outer ones a little shorter and four to six in number, the inner six to eight, all lanceolate, acute (not acuminate) greenish at tip and with narrow hyaline margins; rays purple and glabrous; outer pappus one-quarter the inner; root not slender.

Townsendia strigosa Nutt. The usual form of this plant is a very pretty winter annual with glabrous rays, but one form collected in Wyoming at Church Buttes, July, 1873, seems to be a short-lived perennial. It abounds in the higher Sonoran region of eastern Utah and adjoining Colorado, and is abundantly distinct from *T. Fendleri* or any other species which I know. It does not exist in the mountains which are the home of the allied *T. Fendleri*.

Townsendia Fendleri, Gray. As I understand this species it is a summer bloomer continuing till frost, it seems to begin at a little below 6000 feet altitude and continues to at least 8000 feet. It is confined apparently to the mountains of south central Colorado and New Mexico, being found as far west as Glenwood Springs (Miss Eastwood). The stems are tall strigose and rough and usually decidedly perennial, though it blooms the second year. It is at once recognized by the narrow leaves, very rough pubescence, and much branched habit. The rays are glabrous.

NOTES AND NEW SPECIES.

Thelypodium elegans, n. sp. Biennial, two to five feet high, erect, slender, simple, or branched at the base often; glabrous except racemes and stems, at least the lower ones and rarely the young pods sparsely pubescent with long tangled wool; lowest

leaves oblanceolate, contracted into a broad margined petiole, usually finely denticulate but sometimes coarsely dentate, obtuse, lower stem leaves oblong-lanceolate and denticulate at apex, auricled, upper stem leaves lanceolate and the uppermost ovate, acute, broadly auricled, reduced; racemes one to two feet long, close, wand-like; pedicels five to eight lines long, ascending, rarely horizontal in fruit, slender in flower; sepals narrow, two to three lines long, obtuse; petals white or tinged with purple, four to five lines long, oblanceolate to oblong-obovate; anthers curved and always partly or wholly exserted; flowers usually one-half as long as pedicels; pods one-half a line wide, three inches long, generally spreading at an angle of 45°, occasionally bent in an arc downwards, but no specimens with pods all arched, pedicels never reflexed; stipe a mere rudiment; beak one to three lines long. This is a close congener to *T. ambiguum*, but pods stipeless, beaked, lower stems always pubescent, flowers much smaller and nearly white, and pedicels longer. A form from Green River Utah, that I refer to this species is simple stemmed and with appressed pods.

Westwater, Colorado, May 7, 1891, also adjoining Utah. Common on the adobe plains of the desert.

Caulanthus crassicaulis, Watson var. *glaber*, n. var. glabrous throughout. Otherwise exactly as in the species. Type from Summit near Sink Valley, S. Utah at 7000 feet altitude June 23, 1890. During the present year I have seen this occasionally in eastern Nevada along with the species. It is quite striking but passes into the type.

Lepidium montanum, Nutt. var. *alyssoides* (Gray Pl. Fend. 10). It is so manifest that this is only a more enduring form of *L. montanum* that it is useless to keep it up as a species longer. It passes by insensible gradations into the type.

Lepidium Utahense, Jones in Herb. This is the plant which Watson wrongly referred to *L. montanum* as a form of his var. *heterophyllum*. It was first published by me in my lists of the Flora of Utah collected in 1880 and published early in 1881 but without a description. In the thirteen years which have elapsed since, I have never seen anything to change my original opinion,

though at the time I deferred to his opinion. The plants were collected at Milford, Utah, June 23, 1880, at 5000 feet altitude, in alkaline meadows, being just in flower. Perennial from a deep, large, fleshy, erect root which is often divided at the apex into many dense crowns, the crowns are covered with many stiff dead leaf petioles and with some rosulate new leaves which are two to three inches long with margined petioles a little shorter than the narrowly elliptical blade which is entire, fleshy, barely acute at apex and cuneate narrowed at base; stems erect or the outer ones ascending, twelve inches or less long, simple, purplish at base, glabrous throughout even to the pods except a very minute pubescence on the upper stem which is denser on the pedicels and sparse on the sepals and long; stem leaves one to two inches long, fleshy, entire, barely acute, broadly linear, a little contracted at base but hardly petioled, not at all clasping nor auricled, one-half longer than the internodes, many, scarcely shorter above; spikes short, one to two inches long, sessile or nearly so in fruit, a mere head in flower; pedicels rather stout, short in flower, in fruit ascending but tips usually horizontal, three lines long, round, but with a ridge on either side and so seeming flattened, a little thickened at apex; sepals green, oval, very concave, rounded and hyaline at apex, three-quarter line long, often sparsely long-hairy; petals obovate one and one-half lines long, white; stamens apparently two with large oval anthers half as long as the stout filament, just equaling the short stout style; pods two lines long and a line wide, seeming acute at each end but minutely notched at apex, flat, not winged, elliptical, not corrugated, the two nerves very prominent and raised into a very narrow wing in the middle of the pod, of the same width as the style and seeming to be a prolongation of it; style one-third line long and much longer than the minute notch; pods erect and so at right angles to the apex of the pedicel. Distributed as No. 1821 of my Utah sets.

Astragalus pephragmenus, n. sp. Nearest to *A. glareosus;* referred to *A. Shortianus*, var. *minor* Gray. Perennial, matted from a much branched woody root, stems one to four inches long, spreading on the ground; stipules large and scarious, triangular, very slightly connate below, adnate to the petiole; whole plant

even to the pod shortly villous tomentose; leaves about four inches long, the petiole being one-third of it; leaflets eight to fifteen pairs, oval to elliptical, four lines long, greener above; peduncles including the rachis of the short spike equaling the leaves, stout, sulcate, ascending; bracts three lines long, ovate, scarious; flowers nearly sessile, six lines long, light purple, six to ten in a close raceme or short spike; calyx woolly, four lines long, teeth one-third the tube, subulate; keel two lines longer than the calyx and teeth, barely acute, incurved to one-third circle, purple tipped; wings about the same length as keel; pod an inch long, oblong, nearly straight, base rounded and jointed to a very short stout stipe one-third a line long, apex prow-like and abruptly acute (like *A. Preusii*), dorsal suture very slightly impressed, very narrow externally, ventral suture very thick externally, not impressed but pod often slightly bisulcate ventrally, suture one-half a line thick externally and widest in the middle of the pod; pod one-celled, three lines wide, very thick walled (one-twentieth inch thick in the dried specimen), inner wall dense, outer spongy; pod wrinkled longitudinally and obscurely so transversely; pubescence of pod minute but rather close and tomentose; hairs of the plant very slender, attached by the base and nearly smooth. This plant at once suggests *A. glareosus*, *Missouriensis*, and *Shortianus*, but differs from them all in apparently good characters. I doubt if any connecting forms have ever been known that would place this as a form of *A. Shortianus*.

This was gathered on the summit of the Pinal Mountains, Arizona, May 26, 1890 in rocky places. I have been inclined to place it as a form of *A. Chamæleuce* and the latter plant I think is the same as *A. glareosus* the older species, but I now regard it as a good species. It is in my sets recently distributed.

Astragalus Purshii Douglas. The very imperfect description of this plant given in Flora N. A. T. & G. is manifestly the type as it exists in the great region which it covers, but there are two errors in the description, the flowers are not one and one-half inches long and they are not yellow. Others have followed the same error as to color of the flowers, being led astray by the color in the herbarium and by old flowers; the flowers are white

when fully developed and as they fade or become old they turn to a rich cream color. I have never yet seen a truly yellow flower even in a herbarium specimen. It is one of the earliest spring flowers, coming out along with *Cymopterus montanus*, and is out of bloom in a month or less. I will give a detailed account of field studies on this plant in a later issue.

Through the kindness of Miss Eastwood and Mrs. Brandegee I have been enabled to examine all the material of the *Eriocarpi* in the Herbarium of the California Academy. Of *A. Purshii* I have seen material from Wyoming, Washington, and the Sierras as far south as Tehachapi and Tejon Mountain, California.

Astragalus Purshii, Douglas var. *tinctus*, n. var. leaves very broadly obovate, small; flowers purple, otherwise as in the type.

Edgewood near Mt. Shasta and also in Ventura County, Cal., Brandegee; Olanche and Keeler, Inyo County, Cal., Brandegee; the former also by Miss Eastwood, Soda Springs, Nevada County, Cal., 1882 Jones, and an intermediate form June 16, 1882, Austin Nevada, Jones. This seems to belong to western Nevada and the Sierra Nevada region. It should be remembered that the type of *A. Purshii* is stemless.

Astragalus Purshii, Douglas var. *longilobus*, n. var. Calyx lobes filiform nearly equaling the keel; peduncles as long as the leaves; otherwise as in the type. Tehachapi, June, 1884, Brandegee; Aurum, Nevada, May 4, 1893, Jones (not in fruit). Also Tanesville, Cal., June 30, 1892, Brandegee. This has very long stipules and pod of *A. inflexus*, but the woolliness of *A. Purshii*. Connecting forms occur, but as yet I have seen no specimens which I could not at once separate from *A. inflexus*.

Astragalus inflexus Douglas. A plant in the Herbarium of the California Academy by Canby from Washington, 1883, has a stem six inches high, with six leaves or joints from a closely branched root; whole plant white with long and very fine hairs, having a floccose appearance, but the hairs are not much tangled; stems zigzag; proper petiole an inch or less long; stipules and bracts the same as in *A. Purshii*, but usually wider; six lines long, hyaline, tapering from base to a fine, threadlike point; leaflets ten to fifteen pairs, elliptical, six lines long, sharply apic-

ulate, at least the most of them, acute at base and a little cuneate; nodes of stem shorter than the leaves, which are three to four inches long; naked part of peduncle as long as the leaf, erect; flowers racemose, few; fruiting pedicels one to one and one-half lines long; calyx hyaline, not much inflated, cylindrical, tube five lines long, teeth nearly the same and almost filiform except at short triangular base; blade of keel two lines long, purple tipped, very long clawed; wings a little longer than keel, and banner a line longer than wings; flowers not large and probably white; pods ascending, short-stalked and jointed at tip of stalk, as in *A. Purshii*, the stalk being one-third to one-half a line long and stout, pods simply shaggy as in *A. malacus*, fleshy, finely wrinkled, usually bent into a half circle, three lines wide, one to one and one-half lines thick, much obcompressed till the sutures nearly meet, with a very broad, shallow sulcus above and below, point of pod sharp but scarcely flattened; seeds rather large, a line long; pods cartilaginous.

Two forms which I refer to *Astragalus Utahensis* T. & G. in the Herbarium of the California Academy are one from Candelaria, Nev., by Shockley, with flowers and peduncles of this species and the pubescence less woolly and stems not branched; and one by Brandegee from Pyramid Lake, Nevada, which is this species, but the pubescence is more that of *A. Purshii*.

*Astragalus leucolobus.** This is a specimen from Mr. Parish in my herbarium labeled "Watson"; if it has been published I do not know it. The plant is many-stemmed from a somewhat woody root and stems short, one to two inches long and decumbent; nodes shorter than the large, triangular, acute, hyaline, free stipules; peduncles four to five inches long, ascending, rather stout, three to five-flowered at the tip, and with flowers close together; bracts hyaline, broadly ovate to lanceolate, acutish, one to two lines long; pedicel almost none; flowers nearly horizontal, purple but lighter below; calyx cylindric, three lines long, one line wide, inclined to be narrowed at apex, base oblique; teeth very short, triangular, one-half a line long, erect;

* It is probable that *A. leucolobus* is a clerical error for *A. lactulus* Watson Proc. Amer. Acad. 22, 472, as the description there given accords with the plant under consideration.

keel gently bent at tip into an arc of a circle, blade two and one-half lines long, less than a line wide, obtuse; linear wings barely surpassing keel; banner a little longer than wings and ascending; flowers about three lines longer than calyx, and calyx scarcely deeper cleft above and but little inflated; pods immature, but apparently about the size of *A. Purshii*, but base nearly straight and apex hooked, thin, sulcate dorsally one-half a line deep, cross section probably obovate-cordate, apparently very shortly stipitate in the calyx, white with a dense, very short pubescence. The leaves are two to three inches long, of about ten leaflets, which are close set, three lines long, elliptical to oval, obtuse; petiole one to two inches long; whole plant hoary with close, fine, short hairs. This has the look of *A. Utahensis*, but with shorter and stouter flowers and longer peduncles. It may not belong at all to the *Eriocarpi*, but its true position cannot be made out without mature pods. Collected by S. B. Parish in Bear Valley on San Bernardino Mountain, Cal., June, 1892.

To this I refer a specimen collected by Miss Eastwood on Cantua Mountain, Cal., May 19, 1893. It either belongs here or is a new species. The nodes are a little longer, short stems much branched; leaflets two lines long, oval; pods shaggy with dense long hairs as in *A. Utahensis*, hooked at the end as in this species; whole plant shaggy and hoary; pods immature. Manifestly closely allied to *A. Utahensis*.

Astragalus lentiginosus, Douglas. To this species I have referred with some doubt a plant sent by Mr. Brandegee from Lone Pine, Cal., May 16, 1890. It has the long peduncle of the var. *Fremonti*. The calyx is oblique and like that of *Hedeoma Drummondi*, a line long with lobes as long and subulate, cleft deeper above, hoary with white appressed hairs, flowers and pods horizontal; keel abruptly incurved to more than 90°, a line shorter than the ascending, linear-oblong wings which are rounded at apex, light purple; banner light purple, a line longer than wings, nearly erect, large, sides reflexed; peduncles four inches long, longer than the leaves, ten to fifteen-flowered above the middle, racemose; pods congested, oval, abruptly short-pointed, three-quarters inch long, one-half inch wide, papery, glabrous, or very minutely pubescent when young;

lower leaves small, upper the largest, these are oval to obovate, obtuse; stems many, erect, leafy.

I can see no character to surely separate this species from *A. diphysus* Gray, and it is not at all certain that it is distinct from *A. Coulteri.*

Astragalus lentiginosus Douglas. A plant collected at Alcalde, Cal., 1890, by Mr. Brandegee would fall under the variety *Fremonti.* It is evidently perennial, one and one-half feet high, erect, whole plant tomentose-canescent, sparse above; calyx densely black-hairy, cylindric-campanulate, three lines long, a line wide, teeth one-third the tube; flowers ochroleucous, five lines long; peduncles a little surpassing the leaves, densely flowered; pods very shortly stipitate and jointed at tip of stipe, sparsely hairy; leaflets about ten pairs, obovate; no petiole above.

Astragalus latus (*A. diphysus* Gray var. *latus* Jones, Zoe iii, 287). It is manifest that this is a distinct species as I have had a chance to study it this season from the beginning of its development to the end. It forms a loose mat on the ground, which is from one to two feet in diameter, the stems are short and the leaves long, the peduncles only half as long as the leaves and so the flowers are hid among the leaves, calyx thickened at base and the lower side the longer but straight, hyaline, white, sprinkled with minute black hairs, four lines long, one and one-half lines wide and a line thick, not bent nor uneven in width, cleft deeper above, teeth unequal, subulate, about a line long, inclined to spread; banner usually with sides not reflexed, ovate, four to six lines wide in the middle, bent abruptly at tip of calyx teeth at an angle of 45°, six lines longer than calyx, deeply notched at tip, thin and not thickened at base, light pink-purple, occasionally the outline of the banner is oblong, triangular or even fiddle shaped by the varying position of the sides; sulcus conical, and very small at its apex the tip of the keel; white spot obovate, cut up by radiating purple veins, reaches within one and one-half lines of the tip; wings narrowly oblong oblanceolate to broadly oblanceolate, rounded at apex which is often considerably enlarged, minutely notched on the lower side near the apex, one and one-half lines longer than the keel and purple at apex and lighter below, ascending 45°, concave to keel and

spreading at tip; keel straight, with tip incurved a little more than 90°, obtuse, purple at tip, exceeding calyx teeth by two and one-half lines; pods mottled, colored, or plain, sessile, very acutely long or short-pointed with incurved tip, much inflated, broadly to narrowly ovate, inclined to be retuse at base, cross section round or a little wider laterally, sulcate ventrally nearly to the middle and the contiguous sides not adherent, sulcate dorsally to beyond the middle so that the sulci meet but there is no septum between even when young, though the parts adhere, with age they separate, the contiguous sides of the dorsal sulcus adhere when young forming a false septum so that the pod seems to be only slightly sulcate dorsally, but as the pod matures the sides separate and so it becomes didymous, apex of pod not two-celled; mature pods chartaceous to membranaceous, immature pods slightly pubescent within with wall one-fortieth inch thick. Neither peduncles, stems nor petioles perceptibly sulcate; stipules adnate, triangular, not small, ciliate and inclined to be lacerate on the edge, acute, lower not larger; flowers loosely short spicate; peduncles none to four inches long; flowers three to ten; pods prostrate as well as the flowers; whole plant very glabrous. This is a mountain plant coming down the cañons to 7500 feet altitude, grows on loose, gravelly places by the roadsides and is not abundant; it never grows in alkaline places. The pods are destitute of any internal sap at all times. It begins to bloom about May 1, and continues for a month; the pods are mature by the first of July.

By way of amplification of what I have said about the confusion in species of the *A. lentiginosus* and *curtipes* group (Zoe 4, 28) I append some notes on species kindly sent me by Mr. Brandegee.

Astragalus near to *ocarpus* San Thomas, Lower California, April 26, '93. Same as the following except more robust and tall; peduncles not longer than leaves, stout; stem coarsely sulcate; leaves six inches long; petiole none; leaflets about twenty pairs, an inch long; pods more acute; flowers white, four lines long, narrow, calyx the same; keel abruptly rounded, straight, nearly equaling the oblanceolate, scarcely ascending wings; banner erect, small, barely a line longer than the keel

and one-half a line longer than the wings; stipules green, rather stiff, reflexed, triangular, acute, two lines long.

Astragalus near to *Parishii.* Vallederos Creek, Lower Cal., May 4, 1893. Stems ascending, many from a perennial root, a foot high, nearly smooth; peduncles four to six inches long, longer than the leaves; flowers small, three lines long, yellowish, spicate at the tip of the peduncle, reflexed; calyx campanulate, tube a line long, teeth triangular, one-half a line long; pods an inch long and half as wide, broadly elliptical, sessile, spicate, horizontal, one-celled, chartaceous, much inflated, barely acute, dorsal suture much more convex than the ventral, ventral suture somewhat inflexed, sutures thin; seeds rather large, on short stalks, confined to the middle of the pod as in most of this group, several; stipules triangular, not reflexed, two lines long; pedicels less than a line long, about equaling the ovate bracts; petiole an inch or less long; leaflets oblong, about eleven pairs, obtuse at apex and acute at base. The pods are finely reticulated, glabrous or minutely pubescent when young.

Astragalus between *oocarpus* and *Parishii.* San Pedro Martir, Lower California, May 6, 1893. About the same as *A. Parishii,* but stipules almost hyaline and seldom reflexed; peduncles twice as long as the leaves, with yellow flowers above the middle; pod one and one-half inches long; keel arched, wings very much so. It is quite probable that one polymorphous species will cover most of this group.

Astragalus Hookerianus Gray. This neat little group represented by two supposed species can be described so far as known in two words, i. e., pods balloon-shaped. Mr. Brandegee's specimens from Susanville, Cal., June 30, 1892. Stems a foot high, decumbent at base only; very minutely pubescent; leaflets elliptical to linear one-third to an inch long, acutish, about seven pairs; leaves two to four inches long and proper petiole less than an inch long; peduncles four to six inches long; flowers racemose near the end of the slender peduncle, in fruit distant; pods two inches long, half as wide, papery, finely reticulated, more or less spotted, rounded at apex and tapering into a stipe, ascending or nearly erect, much inflated, sutures very small and not at all

intruded; seeds large, fully a line long and nearly round, on a stalk a line long, few, confined to the middle of the pod; calyx one and one-half lines long, campanulate, scarcely oblique at narrowed base; subulate teeth one-half shorter. The cross section of the pod is probably round.

Specimens collected by Mr. Lemmon in Sierra County have long underground stems and short ascending stalks, four inches high, decumbent; pods thicker, one-half as large, more attenuate, with the stipe only equaling the calyx; leaves ovate to elliptical, acute, with prominent midnerve and very hairy. This would seem to connect with *A. Whitneyi.* The pods of both these species are one-celled. The flowers are not found in these specimens, but are said to be white in the former and purple in *A. Whitneyi.*

Astragalus proriferus n. sp. San Pedro Martir, Lower California, May 5, 1893, Brandegee. Allied to *A. Hornii.* Shrubby at base, one to two feet high, stems ascending, whole plant hoary with very short woolly pubescence which is denser above; the flowers only are glabrous, not the calyx; leaves four inches long, with a petiole an inch or less long; leaflets about ten pairs, oblong-lanceolate and obtuse but apiculate, to obovate and obtuse and not apiculate, three to ten lines long and one to three wide, acute at base; stipules triangular, herbaceous, acute, two to three lines long, upper ones little reduced; peduncles stout, one-half as thick as stem, six inches long, erect, many flowered from below the middle, racemose in fruit and spicate in flower; flowers dark purple, but keel lighter, fading to ochroleucous; calyx broadly campanulate, tube a line long, oblique, cleft deeper above; pedicels almost obsolete shorter than the obscure ovate bract, teeth as long as the tube, subulate, erect; keel three lines long, bent abruptly to a right angle or more at tip, acute, arched a trifle; wings lanceolate and apparently notched at tip; banner rather large, nearly round, ascending so abruptly from a point beyond the calyx teeth, a line longer than wings and keel, emarginate; pods obliquely ovate to oval, six lines long, three to four wide, chartaceous, inflated, one-celled, neither suture in the least inflexed, dorsal suture not evident, ventral suture much thickened in the middle where only, it is

seed-bearing, sessile, rounded at base, early splitting the calyx, cross section apparently broadly obovate, tip with a very pronounced flat and sharp, triangular beak, two lines long; dorsal suture very convex, ventral slightly so; seed stalk one-half a line long. Flowers and pods horizontal or nearly so. The spike of flowers reminds one of those of *Oxytropis deflexa*.

Astragalus inversus, n. sp. Allied to *A. stenophyllus* and *collinus*. Susanville, California, July 1, 1892, Brandegee. Glabrous throughout. Stems flexuose two feet long, straggling upward, small, apparently simple, faintly angled, floriferous above the middle, nodes two to three inches apart; stipules, lower ones, rather small and united at base, the rest green and tapering to a long point and reflexed, four lines long, distinct; peduncles ten inches long, as stout as the stems, at least twice as long as the almost filiform petiole and leaflets; leaflets an inch long, distant, about three pairs, all jointed to the petiole; flowers loosely racemose on the upper half of the peduncle, six to ten, distant in fruit, ochroleucous; keel very gently arched at tip and blunt, narrow, rather long-clawed, six lines long, nearly equaling the narrow obtuse wings and small banner, the latter ascending only; calyx teeth very short-triangular, one-quarter the length of the campanulate tube which is one and one-half lines long and narrowed at base, not oblique, apparently equally toothed, dark and finely pubescent; pedicels a line or less long; bracts minute, ovate; flowers ascending, in fruit reflexed but not pendulous; pod long acuminate at each end, compressed, one and one-half inches long, two lines wide, linear, cross section elliptical or narrower, one-celled, sutures not prominent nor at all impressed, dorsal suture concave and ventral convex and so the pod seeming wrong side up; stipe not jointed, nearly an inch long about half as long as the pod; seeds nearly round, many. The pod is purple and streaked with white, cartilaginous.

Astragalus collinus Dougl. var. *Californicus* Gray. To this I refer with some hesitation a plant collected at Ager, Siskiyou County, California, July, 1887, by Brandegee. Glabrous, cartilaginous, reticulated pods two inches long, two lines wide, and stipe three-quarters of an inch long, cross section oval, seeds a line

long and oval; leaflets ovate to oblanceolate, six lines long; leaves three inches long and calyx softly pubescent and whole plant otherwise glabrous; peduncles six inches or more long, erect and as stout as the stems; calyx campanulate with tube two lines long, the short triangular teeth one-third as long as tube; flowers not seen; pedicels stout, a line long; bracts very small; many stemmed from a woody root, one and one-half feet high, but base of stem bent, branched below. This at first sight seems to be very distinct from *A. collinus* but I cannot refer it elsewhere.

Potentilla (*Ivesia*) *Kingii*, var. *incerta*, n. var. Densely white silky throughout; leaflets obovate or ovate, densely imbricated; leaves three inches long, more slender than the type. Otherwise as in the type. Alkaline soil in the middle of Steptoe Valley E. Nevada, 5700 feet altitude, July 13, 1891. I am not able to compare this with *Potentilla cremica*, Coville which from the description would seem to be the same, but this is manifestly only a variety of the type as it shades into it.

Cymopterus purpurascens (Gray) *C. montanus* var. *purpurascens* Gray Bot. Ives. I cannot think that this plant which is so common from one end of Utah to the other and covers so wide a range is a form of the Rocky Mountain species which so far is not known west of the mountains of Colorado.

Cypmoterus Fendleri Gray. This species belorgs to my section *Coloptera* and to it should be referred *C. Parryi* (C. & R.), *C. decipiens* Jones. I was misled by Watson's unwarranted reference of one of my specimens to *C. Fendleri* or I should have recognized the true place of *C. Parryi* in the synonymy.

Frasera speciosa Douglas var. *scabra* n. var. Closely resembling the type except that the root leaves are six to eight inches long, one and one-half inch or less wide; whole plant ashy scabrous even to the petals; the leaves are very nervose (seven of the nerves being very prominent), thick; petals oblong, three-quarters inch long, very obtuse and rounded; glands as in the type but very coarse, three to four lines long, attached below the middle and running nearly to the base, oblanceolate, acute at base, coarsely fringed; scales at base of petals coarse; anthers

reflexed, two lines long; stigmas enlarged and club shaped. This seems to be a good species but in view of the great variability in this genus I refer it here. It is about the height of the type, but the leaves are half as large and the flowers twice to three times as large. Collected at Pine on the edge of the Mogollon Mesa northern Arizona, June 2, 1890. Characters common to the type species and this are the long pedicels, narrow and very acute calyx lobes, equaling the corolla; greenish-speckled petals, glands and scales; verticillate leaves; stamens nearly as long as the petals; glands attached below the middle. Gray says in the Synoptical Flora that the glands are attached above the middle, but it is not true.

Notes taken by me this year at Alta, Utah, August 17, 1893, on the type species are as follows: Petals oval, five lines long, three and one-half wide, a little cucullate by the folding of the tip of the petals which are very acute, petals concave; two glands on each petal three lines long and one-half a line wide, they run within two and one-half lines of the tip of the petal and one-half a line of the base, rounded at each end and protected by lacerate hair-like scales a line long; base of petals with stiff scales two lines long; anthers inverted, extrorse, sagittate; stigma spoon shaped, bent, single; stamens just surpassing the stigma, spreading after anthesis.

Emmenanthe foliosa n. sp. A close congener to *E. pusilla* and with the same habit, frequenting alkaline soil. Deep Creek, Utah, June 6, 1891, altitude 5000 feet. Minutely and rather densely pubescent and somewhat glandular; blade of leaves one-half inch long and one-third the slender petioles, irregularly laciniate dentate, lanceolate to oblong, obtuse apex rounded; leaves not fleshy, rosulate mostly; annual, much branched from the base, one to three inches high; flowers single in the forks and in loose racemes which equal the leaves and are floriferous from base of peduncle, three to five flowered; pedicels not longer than the calyx, slender; calyx a line long in flower and two lines in fruit, lobes linear and very little enlarged at apex; corolla barely lobed, yellow and almost equaling the calyx, and overtopping the oval or oval-oblong, rounded and obtuse capsule which has a very short style and is eight-seeded: seeds large,

deeply corrugated at right angles to the length and rather irregularly, no reticulations across the corrugations, or scarcely visible, seeds dark brown.

Compared with *E. pusilla* the flowers are a little larger, yellow, as long as capsule; seeds four times as large and corrugated and scarcely reticulated, while the other has seeds spirally corrugated, black, with pits almost exactly those of a honeycomb and seeds contracted at each end, the seeds of this species are narrower and less pointed; the pubescence is also different.

Phacelia pinetorum n. sp. Habit and general appearance of *P. micrantha*, as slender but less leafy, nearly erect, but rather widely branched, three to eight inches high, first pair of leaves ovate, long-petioled, entire, small, lower leaves simply pinnate with oblong lobes which are not widened at apex, lower petioles not margined or scarcely so and as long as the blade, uppermost leaves oblong-linear, six to twelve lines long, entire or tridentate at apex, sessile, scarcely enlarged at base; pedicels one to four times the calyx, occasionally minutely glandular, always hirsute-hispid as well as the calyx; the leaves are sparsely hirsute pubescent and not glandular; calyx lobes lanceolate or ovate, narrower at apex or acutish, equaling or twice as long as the short campanulate, white or blue corolla; appendages about one-third the distance from the base of filaments to base of lobes and in pairs; capsule globular; seeds few oblong or ovate to oval, very deeply favose, not transversely corrugated nor tuberculate; calyx enlarging.

Under pines in the Deep Creek Mountains at 8000 feet altitude, growing in situations similar to *Polemonium micranthum*, June 12, 1891.

Gilia pentstemonoides n. sp. Cæspitose from a much branched perennial root; leaves linear-oblanceolate, acute, two inches long, densely fascicled at the summit of the root branches gradually contracted into a slender petiole, entire, rather thick, glabrous; paniculate stems four inches high, but proper stem an inch long, with short racemes arising from the axils of the scarcely smaller stem-leaves which are three to five in number; upper

stem glandular-hairy; calyx tube equaling its subulate lobes, a line long, on a slender pedicel as long; corolla blue, salverform, tube three lines long, lobes ovate or oval, one and one-half lines long; stamens and style long exserted; capsule oval, two-thirds the length of the calyx. Collected at Cimarron, Colorado, on rocks, September, 1890.

Pentstemon confusus n. sp. Uniformly referred by Gray and Watson to *P. acuminatus*. About a foot high, glabrous, and inclined to be glaucous; flowers open, inclined to be horizontal; pedicels one to four lines long; calyx lobes very broad, acute, with hyaline margins; corolla three-quarters of an inch long, narrow and with large lobes, narrowest in the middle, gradually enlarged above, bilabiate, veiny, red, lobes in dried specimens blue with a purple sheen; uppermost leaves not auricled, somewhat clasping, seldom ovate; small sterile filament usually glabrous; otherwise as in *P. acuminatus*. This is the same as my No. 1819 in my Utah sets of 1880. This has always been confounded with *P. acuminatus* by Watson and Gray, and is probably the plant of the Great Basin referred to *P. acuminatus*, while the other is confined to the plains of Colorado and northward and may swing westward at the north into Montana. Also collected by me at Detroit, western Utah, May 26, 1891. It frequents dry sandy slopes in the foothills.

Pentstemon Moffatii, Eastwood. This is what I take to be the same plant as described by Miss Eastwood in Zoe and to which I have given a name in my still unpublished manuscript. Mr. Robinson refers it to *P. albidus* with which I do not agree. As I understand that plant it is confined to the region of the plains. I find that these plants are (in my specimens) pruinose pubescent throughout and with glandular hairy inflorescence; the root leaves are oblanceolate to ovate and with a cuneate base; petiole not longer than the leaves; lower stem leaves linear-oblong to oblanceolate, with or without a clasping base; the upper leaves are broadly ovate and with an acute or acuminate apex; flowers on very short pedicels, three-quarter inch long, purple, gradually ampliate, proper tube short; sepals large, ovate to lanceolate, acute; capsule ovate and acute, longer than the

sepals. The insertion of the two pairs of stamens unequally is, so far as my field studies go now, a generic and not a specific character of which I will write more at another time. Collected by me at Thompson's Springs, Utah, on the slopes of the clay hills on May 7, 1891.

Pentstemon deustus, var. *pedicellatus*, n. var. pedicels two to four lines long, rarely six lines long in the lower flowers; upper peduncles obsolete; all the filaments antheriferous; flowers dirty white and veined with purple; six to eighteen inches high, almost glabrous except the pubescent corolla. Among junipers and pinons at about 8000 feet altitude on gravelly slopes of mountains. July 3, 1891, at Muncy, Nevada, and also at Cherry Creek on the fourteenth of July. Local and rather common in such places.

Eriogonum rubiflorum n. sp. Near *E. reniforme* but leaves oval to orbicular, almost glabrous above, densely floccose tomentose beneath, not cordate, on petioles of equal or double length, blade six lines long; loosely pilose at the nodes, branched above, six inches high; pedicels and involucres glandular-hairy; pedicels four to six lines long, usually erect or spreading, but lower ones often reflexed (in rare cases all the pedicels are reflexed); involucres fully a line long, rather deeply lobed and lobes deep blood-red, hyaline-margined; flowers a line long, red with very deep red midvein which stops short of the rounded, emarginate tip; lobes oblong, glabrous. The prettiest of the *Ganysma* group. May 28, 1891, Dugway, Utah, on the open level places at 5000 feet altitude. It is also very common in eastern Nevada in similar situations.

Eriogonum bicolor n. sp. Matted cæspitose forming mats one to two feet in diameter from a very thick woody stem whose bark exfoliates like *Artemisia tridentata*, one to three inches high; whole plant tomentose to the glabrous perianth; leaves linear, revolute, six to eight lines long; peduncles scapose, an inch long, bearing a single rather large involucre or occasionally three; bracts minute, green; involucre two lines high, turbinate, not angled, eight-toothed and teeth short and hyaline; pedicel two lines long, erect; flowers five to ten, a line long, base hemi-

spherical and not prolonged, red; lobes orbicular and generally emarginate, white, equal or nearly so. A casual observer would take this to be a form of *E. microthecum*, but it really belongs to the *Pseudo-umbellata*. May 7, 1891, Thompson's Springs, Utah, on adobe plains.

Eriogonum villiflorum var. *candidum* n. var. This is by far the more common form; densely white tomentose throughout even to the flowers, not at all villous; heads very densely short peduncled. July 21, 1891, at Furber, eastern Nevada, at 6000 feet altitude, also at Glencoe, Dugway, etc., western Utah.

ADDITIONS TO THE FLORA OF COLORADO—FUNGI.

BY T. D. A. COCKERELL.

The following fungi are not all new to the flora of the State, but doubtless most of them, at least, have not been recorded. The literature available to me is not sufficient to indicate precisely what has been placed on record—and had I the means, I have not the time to search the numerous publications which may contain references to Colorado fungi.

The names within square brackets after the species are those of the botanists to whose kindness I have been indebted for the identification of the specimens.

1. *Æcidium ranunculacearum*, D. C. [D. C. Fairchild]—on *Anemone cylindrica*, West Cliff.

2. *Melampsora lini*, P. [D. C. Fairchild]—on *Linum perenne* (the form I think called *lewisii*) West Cliff.

3. *Æcidium compositarum*, Mart var., *helianthi*, Burrill. [D. C. Fairchild]—on *Helianthus nuttallii*, West Cliff.

4. *Æcidium rostelioides*, E. & E. [D. C. Fairchild]—on *Sidalcea malvæflora*, West Cliff.

5. *Æcidium compositarum*, Mart. [D. C. Fairchild]—on *Aster lævis* f. *simplex*, Cusack Ranch, Custer County.

6. *Uromyces euphorbiæ*, C. & P. [Fairchild]—on *Euphorbia maculata*, West Cliff.

7. *Uromyces aconiti-lycotoni*, (D. C.) Wint. [Fairchild]—On *Aconitum Columbianum*, Cusack Ranch, Wet Mountain Valley.

8. *Puccinia atropuncta*, Pk. & C. [Fairchild]—On *Veratrum Californicum*, Cusack Ranch, Wet Mountain Valley. Other specimens on the same plant from the same locality were named *P. Veratri*, Niessl. [Galloway].

9. *Erysiphe communis* (Wallr.) Fr. [Anderson]—On *Thermopsis montana*, Cusack Ranch, Wet Mountain Valley.

10. *Æcidium thalictri*, Grev. [Anderson]—On *Thalictrum* (*Fendleri?*) Smith's Park, Custer County.*

11. *Puccinia fusca* Wint. [Galloway]—On *Anemone patens* var. *Nuttalliana*, Cusack Ranch, Wet Mountain Valley.

12. *Æcidium astragali*, Thum. [Galloway]—On *Astragalus* (perhaps *alpinus*), near Brush Creek, Custer County, prox. 9000 feet. Also identified by Mr. J. B. Ellis.

13. *Æcidium berberidis*, Pers. [Galloway]—On *Berberis Fendleri*, near Durango, collected by Miss A. Eastwood.

14. *Æcidium compositarum* var. *ambrosiæ*, Burl. [Galloway]—On *Artemisia franserioides*, Smith's Park, Custer County.

15. *Æcidium senecionis*, Desm. [Fairchild]—On *Senecio*, Silverton, collected by Miss A. Eastwood.

16. *Uromyces junci* (Desm.) Tul. [Ellis]—On *Juncus*, West Cliff.

17. *Ustilago longissima*, Tul. [Ellis]—West Cliff, May 24.

18. *Puccinia graminis*, Pers. [Galloway]—Near Texas Creek, Wet Mountain Valley, on grass.

19. *Cronartium asclepiadeum* var. *thesii*, Berk. [Ellis]—On *Comandra pallida*, along Short Creek, Wet Mountain Valley.

20. *Tuberculina persicina*, Ditl. [Ellis]—On *Æcidium* on *Berberis Fendleri*, near Durango, collected by Miss Eastwood.

21. *Puccinia violæ* (Schum.) D. C. [Galloway]—On *Viola*, Elk Mountains, above timberline, collected by Miss Eastwood.

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* I find, however, that an *Æcidium* from the same species of plant and the same locality was identified for me by Mr. Galloway as *Æ. sommerfeltii* Johanson.

22. *Puccinia aberrans*, Pk. [Ellis]—On *Erysimum asperum* var. *arkansanum*, along Willow Creek, Wet Mountain Valley.

23. *Oidium monilioides*, Lk. [Ellis]—On grass, near Short Creek, Wet Mountain Valley.

24. *Uromyces scutellatus* (Schrank) [Ellis]—On *Euphorbia montana*, near Short Creek, Wet Mountain Valley.

25. *Æcidium monoicum*, Peck. [Farlow]—On *Arabis*, near Short Creek, Wet Mountain Valley.

26. *Melampsora epilobii* (Pers.) Fckl. [Ellis]—teleutospores; Wet Mountain Valley.

27. *Uredo ribicola*, C. & E. [Ellis]—By Short Creek, Wet Mountain Valley.

28. *Phragmidium subcorticium* (Schrank) Wint. [Ellis]—On rose, along Short Creek, Wet Mountain Valley.

29. *Puccinia caricis* (Schum.) Reb. [Ellis]—Along Short Creek Wet Mountain Valley.

30. *Puccinia suaveolens*, Pers. [Ellis]—On *Cnicus*, near Ula, Custer County.

31. *Puccinia variabilis*, Grev. [Ellis]—On *Taraxacum officinale*, Hardscrabble District, and along Swift Creek, Custer County.

32. *Poria tenella*, B. & Cke. [Ellis]—Wet Mountain Valley.

33. *Trichoderma viride*, Pers. [Ellis]—Wet Mountain Valley.

34. *Hemiarcyria clavata*, Pers. [Ellis]—Along Short Creek, Wet Mountain Valley.

35. *Entypa subtecta*, Fr. [Ellis]—on *Populus tremuloides* Wet Mountain Valley.

36. *Odontia fimbriata*, Pers. [Ellis]—near Short Creek, Wet Mountain Valley.

37. *Næmaspora populina*, Pers. [Ellis]—on bark of Cottonwood, Cottonwood Springs, Pueblo County.

38. *Hypoxylon rubiginosum* (Pers.) Fr.—near Short Creek, Wet Mountain Valley. Identified by Mr. Ellis.

39. *Valsa nivea*, Fr. [Ellis]—on *Populus tremuloides*, Wet Mountain Valley.

40. *Hypomyces aurantius* (Pers.) [Ellis]—on *Populus tremuloides*, Wet Mountain Valley.

41. *Hypocrea richardsoni*, Berk & Mont. [Ellis]—on *Populus tremuloides*, Swift Creek, Custer County, and Los Pinos Creek basin, Saguache County.

42. *Lentinus sulcatus*, Berk. [Ellis]—Near West Cliff.

43. *Polyporus biformis*, Ketz. [Farlow]—By Swift Creek, Custer County.

44. *Polyporus arcticus*, Fr. [Ellis]—Near Swift Creek, Custer County.

45. *Polyporus arcularius*, Fr. [Ellis]—Pueblo County.

46. *Polyporus carsius*, Fr. [Ellis]—Wet Mountain Valley.

47. *Polyporus adustus*, Fr. [Ellis]—Wet Mountain Valley.

48. *Polyporus hirsutus*, Fr. [Ellis]—Near Short Creek, Wet Mountain Valley, alt. 8400 ft.

49. *Elaphomyces variegatus*, Vitt [Ellis]—Near Texas Creek, Wet Mountain Valley.

50. *Tulostoma mammosum*, Fr. [Ellis]—Near Brush Creek, Wet Mountain Valley.

51. *Mycenastrum corium*, Desv. [Ellis]—Wet Mountain Valley.

52. *Lycoperdon lilacinum*, Berk. & Mont. [Ellis]—Near Swift Creek, Custer County.

53. *Boviista circumscissa*, Berk. & Curt. [Farlow]—Near Swift Creek, Custer County, very common.

54. *Morchella esculenta*, Pers. [Ellis]—By Swift Creek, Custer County.

55. *Coprinus ephemerus*, Bull. [Ellis]—Near Short Creek, Custer County.

56. *Lenzites sepiaria*, Fr. [Ellis]—Wet Mountain Valley.

57. *Agaricus campestris*, L.—Custer, Montrose, Mesa, and Gunnison Counties.

BOTANICAL NOTES.

South of Monterey, along the coast there is a place that is known as Slate's Hot Springs. Mr. Slate's house is the only one, and his neighbors are remote. Behind the house a gulch extends up into the hills and along the mountain stream the redwoods, madroñas, laurels, and chestnut oaks make a deep shade. It was in an open spot in this ravine that a strange strawberry was found differing noticeably from the common *Fragaria Californica*. The petals were yellow, sepals large, peduncles erect and the brilliant red fruit had a sweet, insipid taste. Quite a patch was seen in a limited area.

Mrs. Slate explained the introduction of the stranger which proved to be *Fragaria Indica*. She had bought it from a florist and planted it in a hanging basket out of doors. The birds were attracted to the berries, and so the seeds had been distributed to two distinct localities where it seems to flourish. It may become common along the coast, and this record of its introduction will be of value in settling its origin. All well-authenticated instances of the agency of birds in distributing plants ought to be noted.

Aquatic plants are more alike the world over than any other class, and it is explained when it is remembered that water birds travel far and carry seeds in their stomachs, in their plumage, and in the soil that collects on their feet.

The common German Ivy, *Senecio scandens*, is another escape from Mrs. Slate's flower garden. It grows along the ocean cliffs where the hot sulphur springs are situated. It has become vigorously naturalized also in San Francisco along the Presidio marshes and in other places.

Ceanothus impressus Trel. was collected by L. Jared southwest of Guadalupe, towards Point Sal, Santa Barbara County, about fifteen years ago, and has recently been re-collected near the same place by Mrs. Ida M. Blochman.

Prunus fasciculata Gray is reported by Mr. Jared from the sand hills between Moro and Pecho Beach. It is reported also by Mrs. Blochman.

Leptosyne gigantea Kell. was sent to Harvard about fifteen years ago by Mr. Jared. It was its first discovery on the main-

land. Mr. Jared found it growing abundantly near the old wharf at Point Sal.

Calamintha mimuloides Benth. is reported, in the Botany of California, from the Carmel River, Monterey County. It has recently been discovered by Dr. H. E. Hasse at Acton, Cottonwood Cañon, San Bernardino Range, Los Angeles County.

A. E.

E. L. GREENE *VERSUS* ASA GRAY.

Edward L. Greene, Professor of botany at the State University of California, makes, in the August number of the Torrey Club Bulletin, an entirely uncalled-for attack upon the greatest systematic botanist America has produced, and as that journal has a rather restricted circulation on the Pacific Coast, the paper is here reproduced that botanists of the West may have an opportunity of judging what manner of defense Professor Greene is able to make against criticism and what weapons he is capable of using. Few will believe that this article would ever have appeared if Gray were living.

NEW HONORS TO OLD WEEDS.

BY EDW. L. GREENE.

The modern history of Californian botany was taken up by men who had never seen the field of their researches, and who had no conception of the number of foreign plants that had become naturalized in this part from Europe a hundred years ago. Many of these had not made their appearance in New England, and were unfamiliar to New England botanists. Several such plants, well-known to botanists in general for several centuries, obtained new names at the hands of writers of the East, as if they had been quite new to science. Dr. Britton, in the last issue of this journal, has been able to identify as old, one of my own supposed new plants; and I may here be allowed to indicate that botanists of note have added to synonymy in this manner, before me. Asa Gray, in his day, gave new names to not less than five extremely common and familiar weeds of the Old World, the specimens of which had come to him from this unsuspected habitat of California.

When, nearly twenty years ago, the present writer sent him *Convolvulus arvensis* from California, his letter in answer shows that he had considered this to be an exclusively Californian species, the *C. Californicus*, of Choisy; and when, a few weeks later, the real *C. Californicus* was transmitted, he named this *C. Soldanella*, an Old World species. But errors of this kind, of

which he and other so-called "authorities" on West American botany have made scores and hundreds, do not come directly under my heading, being errors that did not go into print. The Old World *Convolvulus* to which Dr. Gray gave a new name, as a new species, and in the wrong genus at that, is a grain field weed, as common in California as in Europe—*C. pentapetaloides*, Linn., which he named *Breweria minima* (Proc. Am. Acad. xvii. 228). This error he some years afterwards discovered and corrected. But there is one seeming more inexcusable which has not yet been corrected, though it was detected by me while Dr. Gray was still living; for I was loath to call his attention to a mistake, the discovery of which by another would naturally be somewhat humiliating. I refer to a new name that he gave to a plant of such ancient and world-wide repute as Pennyroyal, the *Mentha Pulegium* of Linnæus. In this error Dr. Kellogg, it must be admitted, led the way; for when the plant appeared to him he named it as a new *Hedeoma*, *H. purpurea* (Proc. Calif. Acad. v. 52). In working up the Labiatæ for the State Survey volumes, after having examined this plant minutely, Dr. Gray simply transferred it to the Californian genus *Micromeria*, where, as he remarks, it is "anomalous;" and so it stands to-day in the Synoptical Flora, as *Micromeria purpurea*, Gray. It is abundant not only on that island in the San Joaquin River, whence Dr. Kellogg and Dr. Gray had it, but also in several parts of Middle California rather remote from that station; and not more than one species of mint, *M. piperita*, has been more familiarly known in all countries during many centuries.

A dozen years ago I found by the wayside, in Berkeley, a Cichoriacea new to me, and of which no account was given in the State Survey volumes, or in any other American book; but, suspecting it of alien derivation, I soon found it to be *Crepis virens*, Linn., one of the most cosmopolitan members of its genus. But Dr. Gray twice mistook this plant for a new species, assigning it two new names, one in each of two distinct genera. It is his *Malacothrix crepoides* (Pac. R. Rep. xii. 49), and *Crepis Cooperi* (Proc. Am. Acad. ix. 214); and it was a friendly fortune which permitted him to make this correction of a humiliating two-fold error with his own pen. Even *Malva parviflora* was by this author new-named *M. oblusa* when first it went to him from California.

I am said to have given the new name *Paronychia pusilla* to an obscure weed of Southern Europe, of which the real name is *Herniaria cinerea*. It is the only instance in which I have honored an old weed with a new name; and as I have worked upon the Californian flora now nearly as many years as Asa Gray did, my record in this respect seems not likely to prove worse than his, to say the least.

The opening paragraph of Mr. Greene's statement implies what he knows to be untrue. The identification of *Paronychia pusilla* was made in the "Botanical Writings of Edward L. Greene," published in Zoe for April. In the preparation of that

article Dr. N. L. Britton was applied to for some examples of Mr. Greene's Caryophyllaceæ, but very shortly after the letter was dispatched a fragment of *Paronychia pusilla* reached the writer from another source, and it was identifiable at a glance. Some time afterwards, and when the correction was already printed, Dr. Britton replied to my letter by saying that the plant in question was the old *Herniaria cinerea* of Linnæus, and that he had made a note to that effect for publication. The remarks of Mr. Greene on *Convolvulus arvensis* and *Californica*, for which, according to his own account, he has rifled the private letters of Dr. Gray, show a not entirely unexpected moral laxity, and a recklessness of consequences quite out of keeping with his character and which can only be accounted for by his forgetfulness of the old proverb concerning the danger of stone-throwing by one whose house is so roofed and walled and even floored by glass.

The remarks made by Mr. Greene about his discovery during the lifetime of the latter, of Dr. Gray's "inexcusable" error in transferring Dr. Kellogg's *Hedeoma purpurea* to Micromeria and his own magnanimity in shielding him from the "humiliating" knowledge give a pleasant surprise to those who were cognizant of the truly ecclesiastical hatred which he felt for Gray in the last three years of his life. This kind of statement should, however, be made with much caution and a due regard to the danger of the existence of proof that the "discovery" was made at a much later date. Besides, though it is extremely painful to be obliged to demolish another of Mr. Greene's "facts," *Micromeria purpurea* is not **Mentha Pulegium* as he affirms. If he has a specimen of the latter—it is not at all so common in California as he would have us believe—one of his students will be able to tell him that *Mentha Pulegium* has the throat of the calyx closed by a villous ring and belongs to a different section from *Mentha Canadensis*. Dr. Kellogg in the original description of *Hedeoma ? purpurea*† says "throat naked. * * * This

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*This plant has been identified in a paper on the "Flora of Bouldin Island," Zoe, iv, 211–218. Reprint issued August 22, 1893. Dr. B. L. Robinson of the Gray Herbarium concurring after comparison of abundant material from the type locality, sent to him in 1892.

†Proc. Cal. Acad. v. 52.

plant, it may be said, cannot belong to *Hedeoma* for the throat of the calyx is not bearded. * * * In the new genus *Poliomintha* Gray, the calyx still has the villous ring—this, none." Dr. Gray says "naked in the throat."* Possibly Mr. Greene in spite of the unnecessary sneer about Dr. Kellogg leading the way, will admit that the latter's testimony as to easily observable matters of fact coming under his eyes, is trustworthy. Dr. Gray's statement is, of course, of no sort of consequence in the estimation of Mr. Greene, neither is that of the writer who examined the type two years ago in the Gray Herbarium at Harvard.

Mr. Greene says, "A dozen years ago I found by the wayside in Berkeley a Cichoriacea new to me, and of which no account was given in the State Survey volumes or in any other American book," while as a matter of fact *Crepis Cooperi* is given with its synonym in Bot. Calif. i, 436, published in 1876, and the full descriptions therein indicated are both in older American books. The only knowledge Mr. Greene has of these matters is evidently Dr. Gray's own statement in the Synoptical Flora, for in his usual second-hand fashion he copies the incorrect reference given there to the Pacific Railroad Reports.

The concluding short paragraph of Mr. Greene's article contains three distinct misstatements: (1.) *Herniaria cinerea* is not an "obscure weed," but quite the contrary. (2.) It is not the only instance in which Mr. Greene has "honored"! an old weed with a new name. He conveniently forgets *Ranunculus Biolettii*, *Alsinella ciliata*, various species of "Tissa," *Lythrum adsurgens*, *Lythrum Sanfordi* and *Biolettia riparia* though the last, to be sure, only immigrated from Texas. (3.) Mr. Greene may have "worked upon the Californian Flora nearly as many years as Asa Gray did," but if so he furnishes the world with its first example of a sucking botanist. Gray's active work on our Western botany began with The Flora of North America, 1838, and ceased only with his death in 1888. Mr. Greene was born in 1843, and made his first Californian collection at Yreka in 1876, where he was the minister of a small Episcopal congregation. His incumbency lasted for but a few months, and he soon after

*Bot. Calif. i, 595; Syn Fl. ii part i, 359.

left the State for some years. As a systematic botanist Mr. Greene began to write in the year 1880, and his first contribution to the literature of Californian botany was made in 1881.

Mr. Greene is most evidently of opinion that any comparison between his work and that of Dr. Gray must be immensely to the disadvantage of the latter, but there are a few things it might be well for him to remember. One of these is, that Dr. Gray's work on Western botany is essentially that of a pioneer, that he worked always under pressure, and that the great preliminary work accomplished by him has enabled a swarm of others without half his mental grasp to labor acceptably in more restricted fields, and sometimes, as in the case of Mr. Greene, to wound the kind hand which led their first weak footsteps in the determination of plants.

Dr. Gray made many errors, as must be the fate of any botanist so situated, but he never hesitated to admit and correct them, in which characteristic he differs strikingly from Mr. Greene, and he was thoroughly incapable of "covering the nakedness of his own incapacity with the mantle of another's culpability" a process in which it is to be hoped Mr. Greene will have few imitators.

K. B.

BOTANICAL MEETINGS AT THE ANNUAL ASSEMBLY OF THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

SECTION G.—A. A. A. S.

The following papers were read either in full or by title:

Photography as an Instrument for recording the microscopic Characters of Micro-organisms in artificial Cultures, by G. F. Atkinson.

Symbiosis in the Roots of Ophioglossaceæ, by G. F. Atkinson.

Observations on a Rust affecting the Leaves of the Jersey or Scrub Pine, by B. T. Galloway.

Prophylla of Gramineæ, by W. J. Beal.

A new injection Needle for the Study of the Lower Plants, by J. Christian Bay.

On the Food of Green Plants, by Charles R. Barnes.

Results of some recent Work on Rust of Wheat, by B. T. Galloway.

Comparative Study of the Structure and Function of the Sporangia of Ferns in the Dispersion of Spores, by G. F. Atkinson.

The Solandi Printing applied to Botanical Work, by Byron D. Halsted.

Present Aspects of the Nomenclature Question, by N. L. Britton.

Lichens of the Black Hills, by T. A. Williams.

The Bibliography of American Botanical Literature, by J. Christian Bay.

Notes on the Development of *Marattia Douglasii*, by Douglas H. Campbell.

The fructification of *Juniperus*, by John G. Jack.

The Roots of Orchids, by M. B. Thomas.

Preliminary Notes on some Chromogenic Bacteria of the Ames Flora, by L. H. Pammel.

Further Observations on the Fermentation Tube with special Reference to Anærobiosis, Reduction and Gas Production, by Theobald Smith.

Two new and destructive Diseases of Cucurbits, by Erwin F. Smith.

Preliminary Statement concerning Botanical Laboratories and Instruction in American Universities and Colleges, by Conway MacMillan.

On the Quantitative Analysis of the Colors of Flowers and Foliage, by J. H. Pillsbury.

The minute Structure and Development of the Motile Organ in the Leaf of the Red-bud, by S. G. Wright.

The Shrinkage of Leaves in drying, by Byron D. Halsted.

Distribution of the Gramineæ in the United States, by S. M. Tracy.

A Consideration of Species based on the Theory of Evolution, by N. L. Britton.

A Revision of the Genus *Physcomitrium*, by Elizabeth G. Britton.

Deviation in Development due to the use of Unripe Seeds, by J. C. Arthur.

The principal Diseases of *Citrus* Fruits now being studied at Eustis, Fla., by W. T. Swingle.

Cephalurus mycoidea and *Phyllosiphon* sp., two Parasitic Algæ, new to North America, by W. T. Swingle.

An Analysis of the Conditions affecting the Distribution of Plants, by Frederick V. Coville.

A Sclerotium Disease of Plants, by P. H. Rolfs.

Notes on *Ræstelia pyrata*, by L. H. Pammel.

Crossing of Cucurbits, by L. H. Pammel.

A case of poisoning by the Wild Parsnip, *Cicuta maculata*, by L. H. Pammel.

Ulota Americana, Mitten, and *Orthotrichum Americanum*, Beauv., by Elizabeth G. Britton.

BOTANICAL CLUB—A. A. A. S.

The report of the committee on nomenclature, to which had been referred the preparation of a check list, was called for and presented by its Chairman, Mr. N. L. Britton. The manuscript almost ready for the printer was presented, and the following recommendations were adopted:

"*Stability of Specific Names.*—In the transfer of a species to a genus other than the one under which it was first published, the original specific name is to be retained, unless it is identical with the generic name or with a specific name previously used in that genus"—to be amended by striking out all after the word retained.

"That the general sequence of natural orders as taken up in Engler & Prantl's 'Natürliche Pflanzenfamilien' be adopted. [Pteridophyta, Gymnospermæ, Monocotyledonæ, Dicotyledonæ.]"

"That precedence in the same volume be regarded as priority."

The report of the committee appointed last year to consider the advisability of the establishment of an American botanical society was presented by Mr. Barnes. A letter from Mr. L. H. Bailey, Chairman of the Committee, was read as virtually the report of the majority in favor of abandoning the attempt for the present. Eight of the committee thought its organization by the Club impracticable, one favored the organization, but offered no plan of procedure. Mr. Barnes, the remaining member, submitted the following:

"1.—That the Botanical Club approves the formation of an American botanical society whose membership shall be restricted to those who have published worthy work, and are actively engaged in botanical investigation.

"2.—That to this end the Botanical Club proceed to elect ten men, who beyond all question should belong to a society so restricted.

"3.—That these ten be directed to select fifteen additional members, who in their judgment fall well within the limits suggested.

"4.—That the twenty-five persons so chosen be invited to become the charter members of the botanical society, to proceed to organize the same, and to provide for the election of additional members by such methods and on such terms (not incompatible with the intent of recommendation 1) as they see fit."

The names of the first ten selected are not given, but the whole twenty-five are as follows: J. C. Arthur, G. F. Atkinson, L. H. Bailey, C. R. Barnes, C. E. Bessey, E. G. Britton, N. L. Britton, D. H. Campbell, J. M. Coulter, F. V. Coville, Daniel C. Eaton, W. G. Farlow, E. L. Greene, B. D. Halsted, Arthur Hollick, Conway McMillan, B. L. Robinson, C. S. Sargent, F. L. Scribner, J. Donnell Smith, Roland Thaxter, William Trelease, L. M. Underwood, Lester F. Ward, W. P. Wilson. "Two informal meetings of those of the above list in attendance were subsequently held," and a committee was instructed to inform the others of the twenty-five charter members of the action taken, to draw up a constitution, and to report at a meeting to be held beginning on the Monday preceding the next meeting of the American Association.

One would think that there must be a strong motive on the part of some one to form a society in the face of an adverse report of eight out of ten of the committee. That the names do not all represent the best of American botany will probably be conceded. Certainly some of those included set the standard sufficiently low that the young man who has to "win his spurs" before admittance need not grow gray in the effort. It would also be interesting to know which of the botanists honored, consented to the use of their names, and why all of the editors of the Botanical Gazette should be included, while the Torrey Bulletin is cut off with only four.

INTERNATIONAL BOTANICAL CONGRESS AT MADISON.

In July of the present year a call was issued for an International Botanical Congress to be held at Madison, Wisconsin, at the end of the session of the American Association for the Advancement of Science, to be held at that place. The people of the United States are never accused of undue modesty, and in so far as the originators of the movement are concerned, the American botanists have shown themselves no unworthy sons of the nation. Their "International Congress" is likely to go down into history as an ineffectual attempt by a fragment of the American tail to wag the botanical dog.

Early in the year 1892, when the subject was first broached

the editor of the Botanical Gazette made some remarks upon the subject which the character of the Congress renders so extremely pertinent as to make worthy of repetition.

"An International Congress of Botanists is an exceedingly valuable thing, provided it is really what the name implies. If, however, the real botanists, whom we would delight to honor, stay at home, and we have let loose upon us a crowd of quasi-botanists, such a class as is more apt to journey far to congresses than any other, our lines will not have fallen to us in pleasant, places. * * * The percentage of smatterers and cranks is probably as large in other countries as in the United States, and it is well-known that such classes travel further and talk more profusely than any other."*

The Congress duly met and held three meetings. No list of the botanists present being given, we can only infer from the names mentioned that it was in no sense representative even of United States botanists. There seems to have been only one foreigner present, and that one happened to be in the country in charge of a French exhibit at the Chicago Exposition. There was no representative even from Canada or from the Spanish countries south of us. This being the case, the following resolution was adopted without discussion:

"Resolved, that, inasmuch as the attendance of European botanists at this meeting has fallen much below the expectation of the organizing committee, so that the desired international character of the assemblage has not been realized, the name of the meeting be the Madison Botanical Congress."

A committee consisting of Messrs. Bessey, Britton, McMillan, Tracy, and Davis, was appointed to nominate the officers of the meeting, and their nominees were "unanimously confirmed."

Nomenclature of plants was not discussed, it being voted "that inasmuch as the Congress did not possess the international character which had been hoped for, and could not therefore legislate upon questions of nomenclature, it should not further consider the subject."

A committee on the National Herbarium reported, pointing out "the unsafe condition of the present building in which the Herbarium is located, its unusual exposure to loss by fire, and

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* Bot. Gaz. Feb. 1892.

the valuable character of the collections which are contained in it, and urges that steps be taken to provide an adequate and fireproof building for its reception."

The remainder of the sessions was largely occupied by discussions on the "Nomenclature of Plant Diseases," "On the Terminology of Anatomy and Morphology," "On the Terminology of Physiology," "On the Nomenclature of Horticultural Forms," and "On Bibliography." The Congress wisely refrained from committing itself to any extent upon these questions, possibly it occurred to some of the members that the opinions and practice of European botanists might be factors in the settlement of them.

The Congress which began by electing Professor E. L. Greene for its President, ended appropriately by a vote of thanks to Otto Kuntze. K. B.

GILIA SUPERBA. PHACELIA NUDICAULIS.

Since the publication of Plants of Southeastern Utah, Zoe iv, 2, I have distributed specimens of the new and rare species to the principal herbariums of the country. To Dr. B. L. Robinson of the Gray Herbarium I am not only indebted for the knowledge of some errors in determination, but also for the great privilege of examining some of the types, and so I have the chance to make prompt corrections.

Gilia superba, described as a new species, page 122, and figured in plate xxvii, is *G. submuda* Torr. Dr. Robinson compared this with the type.

Phacelia nudicaulis n. sp., page 123, is *P. demissa* Gray. This I compared with the type which Dr. Robinson so kindly lent me.

While it is to be deplored that these species are weighted with an additional name, yet the new descriptions with the field notes and plate may serve to ward off another calamity of the same nature. ALICE EASTWOOD.

RECENT LITERATURE.

On a Collection of Mammals from the San Pedro Martir Region of Lower California, with Notes on other Species, particularly of the Genus Sitomys. By J. A. ALLEN. Bull. Am. Mus. Nat. Hist., v, Author's Ed., Aug. 18, 1893, 181-202. This paper is based upon a collection of 250 specimens obtained by Messrs. Thurber and Anthony. The new forms described are *Sitomys americanus thurberi*, *Sitomys martirensis*, *Tamias leucurus peninsulæ* and *Scapanus anthonyi* from the San Pedro region and *Sitomys gilberti* from San Benito County, Cal.

The American Naturalist, Sept. 1893. *Description of Four New Rodents from California.* By SAMUEL N. RHOADS. The four species proposed are *Sitomys major*, *S. herronii*, *Onychomys ramona*, and *Reithrodontomys pallidus*, all from the southern part of the State.

The Prairie Ground Squirrels or Spermophiles of the Mississippi Valley. By VERNON BAILEY. U. S. Dept. Agr., Div. of O. and M., Bull. No. 4, p. 69. Prepared under the direction of Dr. C. Hart Merriam, Chief of Division. An interesting and valuable economic bulletin, with three colored plates and four outline maps of the United States, showing distribution of species by colored areas.

Report of the Ornithologist and Mammalogist for 1892. By C. HART MERRIAM. U. S. Dept. Agr., 181-200, illustrated by fine colored plates of rodents.

The Nidiologist. Published by Henry Reed Taylor, Alameda, Cal. The initial number of a sixteen-paged monthly was issued in September and the October and November numbers have also appeared. The title is not pleasing and brings into use a hybrid word which might have been avoided. The quality of several articles is far above that found in the amateur papers which appear and perish annually; but these articles are by well-known ornithologists who may not continue their support unless a stronger scientific tone is evidenced. Careless proof-reading is found in all three numbers. The half-tone illustrations are certainly interesting and perhaps as good as can be produced with

the quality of paper and press work. Illustrating birds' nests from photographs and accompanying them with descriptive notes is a large field and will take a long time to exhaust the material, but thus far the fund of new information has been but slightly added to.

Planzenfamilien drags itself along in an exasperating, peculiarly German style. Hoffmann in the latest fascicle of Compositæ completes Cynaroideae and Mutisiaceæ and lacks only a few pages of Cichoriaceæ. He makes the number of genera 806. The changes of interest to Western botanists are as follows: Cnicus is restricted to the single species known as *Carbenia benedicta*. Carduus is maintained with the boundaries given by Bentham & Hooker and Cirsium Scop. is adopted for all the species with plumose pappus, known of late under the name of Cnicus. Serinia Raf. is substituted for Apogon Ell. and Sitilias Raf. for Pyrrhopappus DC.; Microseris is maintained in the limits of the Synoptical Flora, Calais, Uropappus, Phæpappus, Ptilophora, Nothocalais, etc., being included as sections or synonyms; Stephanomeria is retained and Ptiloria Raf. resurrected by Mr. Greene is not even mentioned in the synonymy. Rafinesquia Nutt. is kept up and Nemoseris Greene given as a synonym. In Lieferung 90, Taubert keeps up Hosackia.

Silva of North America vol. v.—Hamamelidæ—Sapotaceaæ. By CHARLES SPRAGUE SARGENT, with fifty-four exquisite plates drawn by C. E. FAXON. Too much cannot be said in praise of this magnificent work, the plates of which with detailed dissections are nearly as useful for study as the living plant, and make one sigh for the wasted time spent over old plates in the vain endeavor to find a meaning which the artist failed to give. The only point we can suggest for improvement is that all the dissections in any given genus should be drawn from the same point of view. The plates of special interest to us in the West are *Rhizophora Mangle*, *Conocarpus erecta*, *Laguncularia racemosa*, *Cereus giganteus*, *Cornus Nuttallii*, *Sambucus Canadensis* var. *Mexicana*, *Sambucus glauca*, *Arbutus Menziesii*, *A. Xalapensis* and *A. Arizonica*, raised to specific rank from a variety of *A. Xalapensis*. *Sambucus callicarpa* Greene is included in the

synonymy of *C. glauca*, but the second species *C. maritima* described from the same clump is not mentioned. Probably it was published too late to find its proper place.

The continual change of names with which we are afflicted at present has led to the printing of the text of *Ardisia Pickeringia* as Icacorea and the plate as Bladhia, and as the synonymy is given in the Index Kewensis there are yet two older names for someone to adopt.

The Development of Azolla filiculoides Lam. By DOUGLAS HOUGHTON CAMPBELL. Extract from Annals of Botany, pp. 155–187, with three excellent double plates.

Index Kewensis an Enumeration of the Genera and Species of Flowering Plants, from the Time of Linnæus to the year 1885 Inclusive, Together with Their Authors' Names, the Works in Which They Were First Published, Their Native Countries, and Their Synonyms. By B. DAYDON JACKSON, *Part I, A.——Den.* 1893.* This monument of Mr. Jackson's untiring industry is absolutely essential to every systematic botanist. The remainder is promised before the end of the next year. The only serious fault is in the matter of dates, which seem to follow no settled rule. The inconvenience is, however, more apparent than real as every botanical writer does or should verify his dates, and it would, by making it so very easy, probably greatly stimulate the practice already far too common of taking up the older names without consideration of the sufficiency of their publication. Undoubtedly errors and omissions will be found in the course of use, but the work bears evidence of great care, the only error in date so far observed by us is in *Aphantochæta* which is given as 1856, and in "addenda and emendata" as 1836. The date on the title page of the part where it occurs is 1857. The good sense and modesty shown in refraining from coining new names, in cases where two valid species bore the same name is in refreshing contrast to the practice of Steudel and a few recent botanists tormented by an itching vanity. The species considered valid are printed in

* The exact date is not given but a copy was mailed in London September 8, and received at the library of the California Academy of Sciences about the end of that month.

Roman, the synonyms in Italic. In this part of the work there are a good many errors, besides those which each botanist will find for himself according to his views, but although it will exactly suit no one, hardly two persons having quite the same opinions, it is on the whole probably quite as satisfactory as would be the work of any other. The lists of species are certain to be eagerly welcomed by certain of the "once a synonym always a synonym" botanists as furnishing opportunity for unlimited changes. K. B.

Transactions of the San Francisco Microscopical Society, Part I. This first part of the publications of the Society is largely historical, the exceptions being interesting articles by Dr. D. W. Montgomery on *Molluscum contagiosum;* Marine Fossil Diatomaceæ from California, and their Zoology, by Dr. A. M. Edwards, and the Santa Monica Diatomaceæ by Henry C. Hyde. A catalogue of its excellent microscopical library is supplied as well as a list of the members, which embraces the names of men who are able to and should do much good work. K. B.

Erythea for September contains an article by Willis L. Jepson on the expedition of La Perouse which visited California in 1786. It is well to refresh occasionally our remembrance of the early navigators, even in cases where their contributions to science were from various causes but slight. Mrs. Ida M. Blochman contributes a paper of interest on "Californian Herb-Lore." Professor Greene furnishes an article on the distribution of some western plants in which he tries to prove that our *Madia sativa* is divisible into three species. His "vernal" and "æstival" periods of flowering will be found quite as unreliable as they are in *Madia elegans.* To save himself further trouble and to satsify the anxiety of the student whom he quotes he might compare *Lepidium Menziesii* Nutt. with *L. bipinnatifidum* Desv. so generally diffused in South America.

The October issue contains a number of West American fungi by Ellis & Everhart, more than half of them in "genera" which are known to be but forms of other genera. Corrections in Nomenclature iii, by Edward L. Greene, on the principle of "once a synonym always a synonym" furnishes new names,

"Forsellesia" and "Bourdonia" for the genera known to us as Glossopetalon and Keerlia, of course with transference of the species as well as genera to the credit of the author. The third instance, more aggravated than even the first two is the transference of Calycanthus L. to Butneria Duhamel, which if adopted would lead to the changing of the large Sterculiaceous genus Buettneria. No species was ever named under Duhamel's Butneria; and Mr. Greene fails to inform us how he succeeded in satisfying himself that it had priority over Beureria Ehret published in the same year, and taken up by Kuntze. *Lotus sulphureus* and *L. tomentosus* are supplied with new names, the author's attention having been called in Zoe for April to their previous use, but *Lotus macranthus* is still unchanged. *Astragalus campestris* Gray is changed to *A. convallarius* Greene because of *A. campestris L.*—now known as *Oxytropis campestris*, and *A. pectinatus* Boiss., a Syrian species is to be called *A. elegantulus* Greene, though the author has not the least idea whether it is a valid species or not. The remainder of the pages are occupied with the doings of American botanists at Madison, which are discussed elsewhere.

The November number under *Novitates Occidentales* describes seven new species of which, waiving for the present the question of their value, *Astragalus demissus* Greene, is a homonym of Boissier's species published in 1849 in Diagn. Pl. ser. i, No. 9, page 50, and *Saxifraga umbellata* Greene bears the same relation to a species of Hooker & Thompson Journal Linnæan Society, ii, (Bot.) 71 (1858). We note for most of the species the usual vagueness of station; Mr. J. G. Lemmon gives some notes on *Pinus insignis* and *P. tuberculata*, which he would have called respectively *P. radiata* Don and *P. attenuata* Lemmon; Mrs. Blochman continues her interesting Herb-Lore notes; and Mr. Greene laments over Baron von Müller's comments on Polanisia which "show that he wholly misapprehends the characters on which Rafinesque's Jacksonia is based, though we have twice announced them very distinctly in Pittonia."

K. B.

Revisio Generum Plantarum Part III. By OTTO KUNTZE. So far as this part is concerned the title is a misnomer. It is

principally occupied by extracts from Kuntze's reviewers and his own comments on the extracts. Only these last are of much interest, most botanists having already read the criticisms in whole or in part. The notes by Kuntze thereon show a great deal of bitterness against unfriendly reviewers and a profusion of abusive epithets which by withdrawing attention from the argument do harm instead of good. He argues throughout from a legal point of view, taking the position that all botanists should be firmly bound by the Paris Code, until that code itself shall be rejected or altered by a thoroughly representative congress. In this light his arguments are fairly consistent, but it is a fact which no one can deny that quite a number of influential botanists did not fully agree at the time with the Paris Code, and that the practice of many others has diverged quite widely from it. So far in the world's history a law is respected in direct proportion to the power for its enforcement. At present this power does not exist, and can only come by organization and the election of delegates who shall represent all botanists and be able to make rules acceptable to the greatest number.

The numerous signs proposed for use in an international system of botany would be a tax upon memory which most botanists would find very wearisome.

The last thirty-three pages are occupied by a "Codex Nomenclaturæ Botanicæ emendatus ab. Otto Kuntze," printed in parallel columns in German, English, and French. It is founded on the Paris Code, but with many alterations often to its improvement. A few extracts will serve to show the spirit of these:

"New names based on synonyms are sufficiently characterized by the synonyms" [but in such cases the synonyms should always have been well characterized].

"A deviation from strict priority is necessary for genera published on the same day and united afterward." (The genus first receiving species after 1753 to be valid.)

"The annulments and alterations of the existing laws shall have no retroactive force and shall be applicable only to new or subsequently renewed denominations after the date of the publication of the resolution concerned passed by the competent

congress. Names before that date shall be entitled to admission."

"Names of genera or species or varieties which after 100 years since their establishment have not been renewed by other botanists shall be prohibited to be renewed in the future" [half that time would seem to be quite sufficient].

"Existing homonyms invalidate such homonyms as are in future competitory or newly established or renewed." [The author has no patience with the "once a synonym always a synonym" rule as a retroactive measure.]

It plainly appears from the above that the author is not without some sensible ideas. It is evident, however, that he needs an English editor in spite of his conviction to the contrary, and the following clause is so extraordinary that it seems hardly possible it can have emanated from a sound mind.

"*Transitory Article.* The generic names proposed by Dr. Otto Kuntze for the new starting-point of nomenclature shall be valid according to the former articles, 1–68. The species-names thereto, as may be found in his Revisio generum plantarum, shall be combined with his proposed acceptable genera, and the combinations of all such names shall be provided with his responsible author's quotation.

"Any editorial alterations shall be reserved to Dr. Otto Kuntze, subject to the consent of the next congress." K. B.

REVIEWS BY THEO. HOLM.

B. RENAULT: *Lycopodiopsis gen. nov. an arborescent Lycopodiaceous plant.**

The present paper is based upon material from the carboniferous formation in Brazil, collected near Piracicaba in the province Santo Paulo.

While these specimens showed several features in common with the genus Lycopodium, the author has observed some divergences, which have seemed to make necessary the establishment of a new genus "*Lycopodiopsis.*" It might be noted, that this plant occurred with some Conifers, Cordaites, Praronius and

* Notice sur une Lycopodiacée arborescente du terrain houiller du Brésil. (Société d'hist. nat. d'Autun. Vol. 3, p. 109–125.)

relics of a reptile, the Stereosternum of Cope. The material consisted of some fragments of a stem, which showed numerous scars from leaves in dense spirals. A transverse section was also obtained of the stem itself; but no organs of fructification were to be found.

The author compares the shape and the arrangement of the leaf scars of this plant with those of others from the same formation, such as Praronius, Lepidodendron, Lepidophloios and various representatives of the Sigillariaceæ, and finds a certain accordance to those of the Lycopodiaceæ. A similar study has been made of the anatomical structure of the stem, which in several respects does not correspond to that of a Lycopodium. This is for instance well marked by the presence of a distinct pith in the Brazilian plant, besides that the mestome-bundles are moved towards the periphery. It might also be objected for the identification of our plant as belonging to the Lycopodiaceæ, that there is a considerable cork developed. But we might, on the other hand, take into consideration, that during the carboniferous period the trees showed constantly a heavy layer of this tissue on account of their exposure to frequent changes of dry or moist atmospheres.

Two species of *Lycopodium* are known from the same formation namely *L. punctatum* B. R. and *L. Renaulti* Brongt., but the author has preferred, as stated above, to consider this plant as representing a new genus *Lycopodiopsis*, species *Derbyi* B. R.

H. ENGELHARDT: *Cretaceous plants from Bohemia.**

The comprehensive studies of Velenovsky upon the cretaceous flora of Bohemia have already called attention to the numerous interesting types, that occur in this flora. It was, especially, these previous works, that induced the author of the present paper to study a collection of plants from the same formation in Bohemia, which had not been examined by Velenovsky. Several species are enumerated in this note and the author gives a very complete synonomy of each species with references to the litera-

* Ueber böhmische Kreidepflanzen aus dem Geologischen Institute der Deutschen Universität, Prag. (Mitteilungen aus dem Osterlande, Vol. 5, New Series, Altenburg i. S.—A. 1892, p. 86. One plate.)

ture, besides describing and figuring some species, which are considered as new to science. These are as follows: *Sphærococcites Laubei* of the Algæ, *Litsæa bohemica* of the Lauraceæ, *Proteoides Reussi* of the Proteaceæ and *Callistemophyllum Bruderi* of the Myrtaceæ.

The ferns are represented by the genera Mertensia, Thyrsopteris, Pteris and Asplenium. Seeds were found of Cycadeospermum, by the author referred to a new species *C. turonicum*, while Sequoia, Widdringtonia and Pinus were among the Conifers. The dicotyledons were represented by species of Ficus, Laurus, Dryandra, several interesting species of Aralia, besides Hedera, Credneria, Magnolia, Bombax, Sterculia and Eucalyptus.

H. B. GEINITZ: *The fossils of Sachsen-Altenburg.**

Animals and plants are enumerated in this paper as they have been discovered in the various geological formations of Sachsen-Altenburg. We will merely consider the plants, of which specimens are noted from the Devonian to the Tertiary formation. Chondrites and Harlania are mentioned from the Devonian, Calamites from the Carboniferous, Palaeophycus, Sphenopteris, Ullmannia and Voltzia from the Zechstone-formation, while a considerable number have been noted from the Tertiary and the "Braunkohl" layers. Among these are a few Cryptogames namely Sphaeria and Lygodium, some Palms and Conifers, the last of which are placed under Dicotyledones! It may be noted at the same time, that the Najadaceæ are enumerated under the same group, the dicotyledoneous plants, and that Nyssa is placed under Santalaceæ, which misprints seem to have been overlooked.

The number of species is relatively very small, although several of the large genera have been discovered, such as Quercus, Ficus, Eucalyptus, Juglans and Carya.

B. RENAULT: *Retinodendron Rigolloti nov. gen.*†

It is a marked characteristic of the plants from the permo-

* Die Versteinerungen des Herzogtums Sachsen-Altenburg. (Mitteilungen aus dem Osterlande, Vol. 5, New Series, Altenburg i. S.—A. 1892, p. 161.)

† Sur un nouveau genre de tige permo-carboniferè, C. G. Retinodendron Rigolloti. (Comptes Rendus hebdom. d. séances de l'Acad. d. sc. Vol. cxv. Paris, 1892 p. 339.)

carboniferous formation, that they possess reservoirs of tannin or various mucilaginous matters, besides resiniferous ducts in great abundance. This is the case for instance in Sigillaria, the bark of which shows numerous secreting ducts; in the petioles of Myelopteris which are almost perforated by gum-ducts; in the leaves and branches of the Dolorophylleæ, where each mestome-bundle is accompanied by numerous ducts; and in the outermost layers of the bark in Colpoxylon, Medullosa and Cycadoxylon which show the presence of a very large number of gum-reservoirs. Such examples might easily be multiplied A very interesting addition to this flora of the permo-carboniferous formation is the new genus Retinodendron, which the author describes in the present paper.

The material, upon which the genus has been established, was collected near Autun, in France, by Mr. Rigollot. It consisted of a stem, of which only the inner part was preserved; the bark was, unfortunately, wanting. The author succeeded, however, in identifying the family to which this stem belonged, and he has referred it to the Gymnospermæ on account of the structure of the hadrome.

The leptome showed the singular fact, that certain parts were composed of several concentrical zones of gum-ducts and sclerotic cells in regular alternation with each other. The content of these gum or probably resin ducts was a brown and somewhat granular substance. The ducts themselves were surrounded rounded by a sheath of thin-walled cells, around which another sheath was formed of similar cells, the walls of which showed some kind of irregular perforation. This first zone of gum-ducts included about fifteen concentrical rows, but outside this was a second zone, consisting of twenty-four rows of similar ducts; thereupon followed a circle of sclerotic cells, after which again a third zone of more than fifty concentrical layers of the same gum-ducts, as described above.

This very regular arrangement of the ducts and sclerotic cells reminds one of the *Poroxyleæ;* but in the latter it is the sieve-tubes and parenchymatic cells, which show this regular arrangement.

B. RENAULT: *The Botryopterideæ.**

The representatives of this family are especially characterized by the leaves, which usually are destitute of any blade, and the organs of fructification are therefore to be found at the apex of the nerves, thus resembling the species of Thyrsopteris and Osmunda. The sporangia are large, 2 mm. in length, their form varying from oblong to pyriform, or sometimes semilunar, circular, or polyëdric; their membrane consists of two distinct layers of different structure. The spores are present in large number, and show various forms, some being round with smooth surface and showing the three radiating lines, which are characteristic of the macrospores; some others are polyëdric, but have not the radiating lines.

These plants seem to have been herbaceous or frutescent, and to have grown in the water, sometimes even submersed. They resemble Osmunda in regard to their habit, but they seem, however, to represent a family, which is well distinguished from the ferns. It is a family that existed already in the Permian-formation, and the numerous specimens which have been obtained were so well preserved as to enable us to establish several genera. These genera are based upon the various forms of the mestome-bundles of the rachis, considered in transverse sections. Following forms are to be distinguished: The "sword-shaped" in Clepsydropsis, the "H-shaped" in Zygopteris, the "ω-shaped" in Botryopteris (showing a form like the Greek letter ω), and finally the "linear" in Grammopteris. The name "Botryopteris" does not indicate the corresponding form of the mestome-bundles as in the other genera; the name has been chosen from the fact that this genus was the very first one in which were observed the large sporangia, united into voluminous masses and botryoidally arranged. The author gives, also, a very complete description of these genera and their respective species.

M. MÖBIUS: *Australian fresh-water Algæ.*†

This paper is based upon a collection of fresh-water Algæ which were collected by Mr. Bailey near Brisbane, in Australia;

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*Note sur la famille des Botryoptéridées. (Société d'hist. naturelle d'Autun, Vol. 4. p. 349–373.)

† Australische Süsswasseralgen. (Flora, 1892. p. 422-450. 22 figs.)

it includes Florideæ, Chlorophyceæ and Phycochromophyceæ, while the Diatomeæ have not yet been identified. The author calls attention to the fact that no species was observed of the genus Cladophora, although *Cl. gossypina* Kütz is reported from Adelaide, and *Cl. Wollsii* Sond. from the Parramatta River. It is also strange that the Characeæ were entirely absent, since this family is very well represented in New Zealand according to Nordstedt. *

Four species are described and figured as new to science: *Coleochæte Baileyi*, *C. conchata*, *Stigeoclonium australense* and *Scytonema subtile*, besides a number of new varieties. The paper contains many critical notes and gives the geographical distribution of all the species in question.

F. Heydrich: *Algæ from New-Guinea.*†

A large collection of salt-water Algæ from New-Guinea, made by Capt. Schneider in the year 1891, has been identified by the author, who enumerates the species in the present paper. Several species of Cyanophyceæ, Chlorophyceæ, Phaeophyceæ and Florideæ are enumerated, and additional notes are given as to the literature and the geographical distribution of the species. The following are described and illustrated as new to science: *Oscillaria microscopica*, *Ectocarpus elachistæformis*, *Streblonema minutula*, *Zonaria parvula* Grev. var. *duplex* and *Bostrychia crassula*.

G. de Lagerheim: *Trichophilus Neniæ.*‡

It is a fact of great interest, that certain Algæ live exclusively upon live animals. Some of these are true parasites and very injurious to their hosts, while some other ones are merely epizoic. To the last category belong for instance: *Cladophora ophiophila*, which grows upon Herpeton, Characium upon Entomostraca, Cyanoderma upon Bradypus, etc. The author has, however, discovered a species of Tricophilus growing

* Australasian Characeæ. Berlin, 1892.

† Beitrage zur Kenntniss der Algenflora von Kaiser-Wilhelms-Land (Deutsch-Neu-Guinea.) (Berichte d. deutschen botan. Gesellsch. Vol. x, Heft 8, Berlin, 1892, pp. 458-485, 3 plates.)

‡ *Trichophilus Neniæ Lagerh.* n. sp. eine neue epizoische Alge. (Berichte d. deutsch. botan. Gesellschaft, Vol. x, Heft 8, Berlin, 1892.)

upon the shell of Nenia, where it formed deep-green spots and was very conspicuous. This species, which shows several differences from *T. Welckeri*, hitherto the only know species of this genus, is described as new and named *T. Neniæ* Lagerh; it was collected in Ecuador.

It seems more than probable that the occurrence of these Algæ upon living animals is a matter of protection; we remember for instance the numerous constellations that occur on the bottom of the sea, where Crustacea: Hyas and others are walking around, covered with a whole forest of Algæ, Hydrozoa, etc., so that the Hyas itself is hardly visible.

G. DE LAGERHEIM: *The glacier-flora in Ecuador.**

The summits of all the higher volcanoes of Ecuador are covered with snow, which persists through the summer. This snow is hard like ice, but is, nevertheless, inhabited by a flora, of which the author gives a very interesting sketch in the present paper. It was especially some earlier investigations upon the same flora, but from collections made in the arctic region, which induced the author to secure material from the volcanoes in Ecuador; these earlier studies were made by Berggren and Wittrock, and by the author himself.

The material was collected upon the snow, which showed the well-known phenomenon of having a deep pink color, the so-called "red snow," and the author enumerates several cryptogames, especially Algæ, as representatives of this singular vegetation.

Chlamydomonas sanguinea, *C. asterosperma*, *C. glacialis*, *Raphidonema nivale*, *Selenotila nivalis* are described and figured as new, and the species of *Chlamydomonas* were the most frequent forms in the red snow. Some other genera were also represented, as for instance: Bichatia, Nostoc, Navicula, Mesotænium, Gloeocystis and others. Of Fungi were observed Chytidrium and the new genus Selenotila, while *Philodina roseola*, which occurred together with the red Chlamydomonades, was the only representative of the animal kingdom.

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* Die Schneeflora der Pichincha. Ein Beitrag zur Kenntniss der nivalen Algen und Pilze. (Berichte d. deutsch. bot. Gesellschaft, Berlin, 1892. Vol. 10, Heft 8, p. 517.)

NOTES AND NEWS.

Mr. O. T. Baron, whose collection of humming-birds has been placed in the museum of the Hon. Walter Rothschild, has again started for South America for the purpose of making collections of small birds, mammals, and insects.

A new publication, *Novitates Zoologicæ*, is to appear from the museum of the Hon. Walter Rothschild, Tring, England, in January, 1894. It will be issued in parts at irregular intervals during the year, making an annual volume of 400 to 600 pages.

Mrs. Katharine Brandegee, returning from Baja California, with the botanical and zoological collections made by Mr. Brandegee and Dr. Eisen during the month of September, was shipwrecked off the coast of California, near San Pedro, in a dense fog, on the night of October 14th. The collections escaped injury.

In the course of a review of Index Kewensis by the editor of the London Journal of Botany, some remarks are made which may be of use in helping us to "see ourselves as others see us." "The aim is to record every genus and species of phanerogams published before the end of 1885—a date which, fortunately for the compiler, precedes the eruption of neo-American nomenclature, which is still raging almost unchecked." "His care throughout has been to avoid the necessity of causing himself to be cited as the authority for any combination of names; and in this he contrasts favorably with too many modern writers, especially in America, whose often ill-considered resuscitation of disused names seems to have been actuated by a 'desire to obtain a cheap notoriety by making new combinations.' Changes of nomenclature on a large scale should be left to the monographers of genera, and Mr. Jackson has acted with judgment as well as with modesty in not attempting them."

The genus Agoseris Raf. into which the species have all been transferred from Troximon both by Professor Greene and by Otto Kuntze, appears to have been taken up before. The Kew Index cites as synonyms of species of Troximon, *A. cuspidata*

Steud., *A. glaucus* Steud., *A. parviflora, rosea,* & *taraxacifolia* D. Dietr.

HALESIA L, a genus of three species inhabiting the southeastern United States, is now undergoing the miseries of nomenclatural reform. There was a *Halesia* Browne, published four years earlier than the one of Linnæus, and although the earlier one is only a synonym of Guettarda, it is raked out of its grave in order to destroy by the "once a synonym always a synonym" process the commonly and long-accepted *Halesia* of Linnæus.

Dr. N. L. Britton, noting the opportunity, in "Garden and Forest" for October 18 inflicts the name "*Mohria*" on a suffering science, as a substitute for *Halesia* L. and duly transfers the species.

Professor Greene, in his Journal "Erythea" of November 3, with his customary happy knack of making every possible blunder, accuses Professor C. S. Sargent of creating the name "Mohria" and proposes "Carlomohria" as a substitute, "vouchsafing" the information that "Mohria" as a spoken name is identical with "Morea," a name already twice employed.

In the meantime Dr. Britton having discovered that there is a recognized "Mohria" among the genera of ferns, invents a new generic name "Mohrodendron" and in Garden and Forest, November 8, again transfers the species.

Halesia in this way has been "honored" in three weeks' time with three new generic names and two sets of binomials, which the botanical world will promptly add to the "ever increasing store of silent synonyms."

"MR. JACKSON'S great *Index* continues to progress steadily and with as much rapidity as the nature of the work will allow. It is now printed off as far as the beginning of E; up to the end of D it occupies 807 quarto pages of three columns each."—Lond. Journal of Botany, March, 1893.

"Part I of the Index Kewensis, dealing with the nomenclature of all known flowering plants, has just been issued in London. It had been confided that such a work was in progress at the Kew Herbarium, and the promise of its publication excited

curiosity and interest in many quarters.''—Erythea, August 1, 1893.

"Professor E. L. Greene tells us, in *Erythea* for August, that 'Part I of the *Index Kewensis* has just been issued in London.' We in London have not yet heard of the publication of Mr. Jackson's great work, with the progress of which the readers of this Journal have been kept tolerably well acquainted.''—London Journal of Botany, September, 1893.

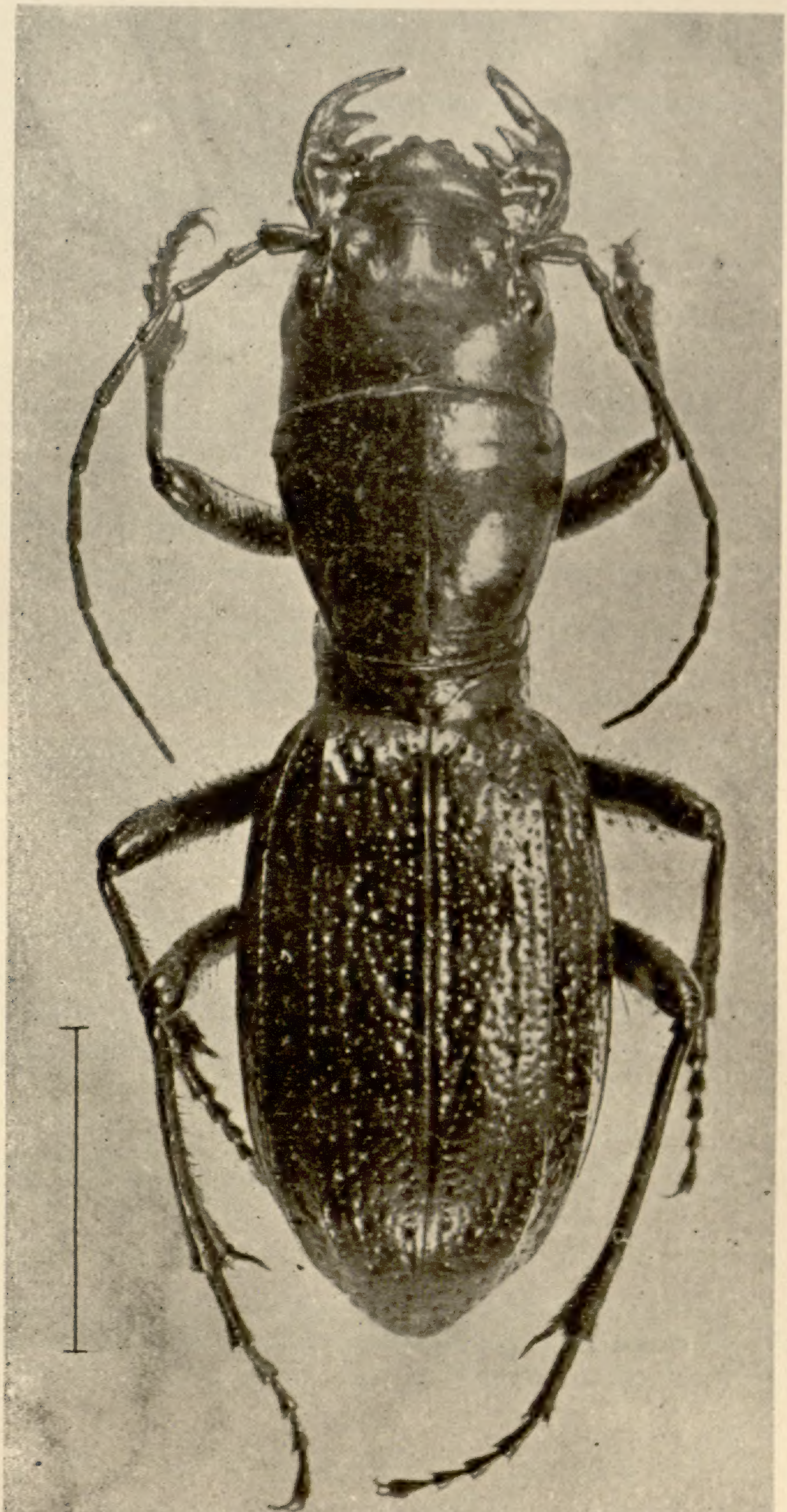
"At least as early as the tenth of July, 1893, a prospectus was circulated in London announcing as 'just ready' Part I of the long-expected Index Kewensis. As a matter of fact it was not ready. The prospectus was, however, shortly on its way to America, and the August number of ERYTHEA announced in 'Notes and News' the publication of Part I of the work. This was contradicted in the London *Journal of Botany* for September, and we were further informed that the readers of that journal were kept tolerably well acquainted with the progress of the Index. We were left to infer that the Index was not out; was not even expected, for the prospectus seems not to have been heard of there. Another month passed. The October number of the journal reviewed the Index Kewensis, Part I. The prospectus had finally come to the light of the astute London editor, and its premature circulation was set down as a fault of Kew, and not due to any creative imagination on the part of the editors of ERYTHEA. * * * Furthermore the editor, in his eagerness to locate responsibility for news notes in ERYTHEA does not guess at all well. He should confine himself to berating the Kew people, which is his forte.—W. L. J.''—Erythea, November 3, 1893.

The second part of the *Index Kewensis* has been passed for press and may be expected very shortly. This concludes the first of the two volumes and brings the enumeration down to the end of J (Justicia). So far the work occupies 1268 pages.—Lond. Jour. Bot., November, 1893.

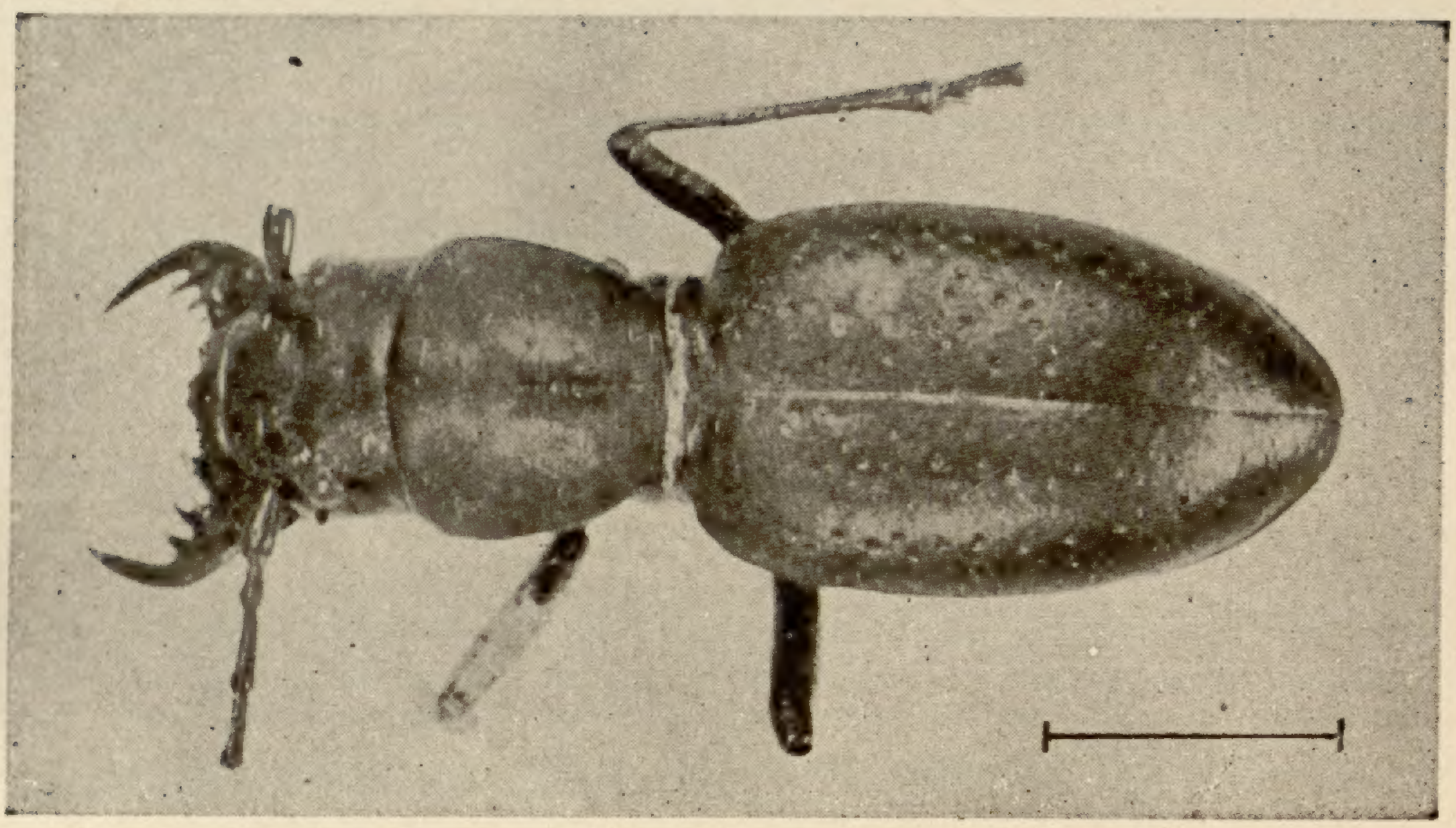
The editor of the London Journal of Botany in the course of a caustic notice of Conway McMillan's "Metaspermæ" makes some remarks which do more than justice to the neo-American reformers. He says: "The 'Botanical Club of the American

Association for the Advancement of Science' has decided otherwise; to such an authority even Mr. Macmillan, albeit reluctantly, must needs bow; and *Taraxacum Taraxacum* with its numerous analogues passes into that limbo which is largely peopled by the unhallowed creations of American reformers. With these go a large number of galvanized corpses * * * for the Botanical Club, which shows distinct signs of sanity in its mode of dealing with these questions, accepts 1753 as the date for genera." The editor will be obliged to retract some of his belief as to the Club's glimmerings of sanity, for at the last session it rescinded its previous action concerning double names and indorsed Mr. McMillan's practice.

Concerning Jacksonia he says: "*Jacksonia* of Rafinesque is one of Professor Greene's numerous restorations, and with his usual promptness in enriching nomenclature he at once ran out four species, but *Jacksonia* has since received its *coup de grace* from Dr. Britton * * * We may be thankful that Dr. Britton's exposure came in time, as I believe it has done, to prevent the substitution of a new name for the well-known *Jacksonia* of Brown." The editor has herein done gross injustice to Professor Greene in underrating the alacrity with which he seizes such opportunities. "Erythea" for May, 1893, contains a list of thirty-six species, all except the first one transferred from Jacksonia to Piptomeris and credited to himself.



A. CYLINDRIFORMIS SAY.



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